A McGRAW-HILL PUBLICATION • FIFTY CENTS

FACTORY

JANUARY
1952

MANAGEMENT AND MAINTENANCE

How to Boost The Maintenance Department's Productivity

1 [illegible]

2 [illegible]

3 ADOPT PAY SCHEDULES THAT FIT THE JOB DEMANDS . . . . . page 74

"Job evaluation is the best and most objective method that has yet been found . . ."

4 DEVELOP SUPERVISORS SO THEY'LL KNOW HOW TO SUPERVISE . . . . . page 76

"There shouldn't be any bosses among supervisors. There should be leaders . . ."

5 APPLY JOB-STANDARDS TO MEASURE PERFORMANCE . . . . . page 78

"Work measurement will cost 3% to 7% of payroll for application . . . but will cut your force 10% to 50% . . ."

6 TRAIN CRAFTSMEN IN BASIC INDUSTRIAL SKILLS . . . . . page 82

"A good craftsman knows enough about other crafts' problems and methods to be a good team worker . . ."

7 IMPROVE WORK-PLANNING AND ADMINISTRATIVE CONTROLS . . . . . page 88

"Paperwork controls are the keystone of an efficient maintenance organization . . ."

To the Personnel Manager who must deliver miracles

in today's tight—and growing tighter—labor market

The squeeze is on, but lessons learned "the last time" can serve you well today.

Here—in a book that's yours for the asking—are dozens of proved-in-use ideas for personnel administrators: How to inventory your manpower. How to match available skills to expanding job requirements. How to spotlight weaknesses. How to maintain required records efficiently. How to increase overall productivity. In short, how you actually *can* work wonders under today's difficult labor market conditions.

Send today for Remington Rand's informative 88-page book "Personnel Administration—Records and Procedure." You'll find it packed with authoritative facts on these vital subjects:

Application Forms and Procedures . . . simplified. Faster screening of applicants. Cutting red tape.

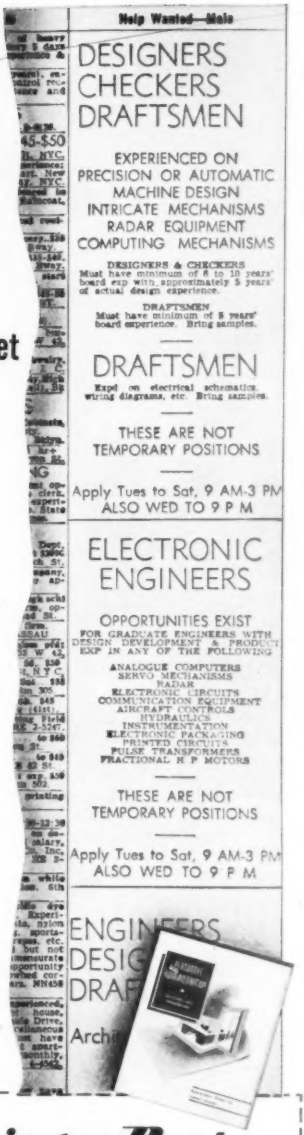
Job Analysis... matching people to jobs...time-saving techniques.

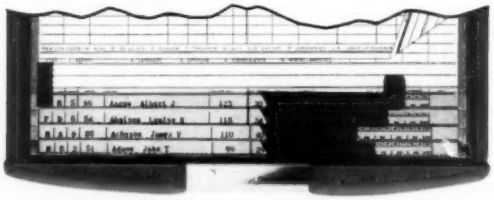
Identification Practices . . . spotting misfits and poor security risks.

Employees' History Records . . . signaling of the facts that affect merit ratings, job transfers, promotions, wage adjustments.

Payroll . . . manual and mechanical systems for handling payroll economically.

You're busy. That's all the more reason why you *need* new, better systems and methods *now*. Rush the coupon today.





KARDEX VISIBLE for personnel facts at a glance

This Employees' History Record shows how Kardex helps so many personnel men "cut corners." The signals in the visible margin tell you *all* the facts you need to know *fast*—at a glance! For the book that shows all the important proved-in-use personnel records, send the coupon today or phone the nearest Remington Rand Business Equipment Center.

Remington Rand INC.

Management Controls Division, Room 1595
315 Fourth Avenue, New York 10, N. Y.

Please put me on your list for a free copy of "Personnel Administration" (X521).

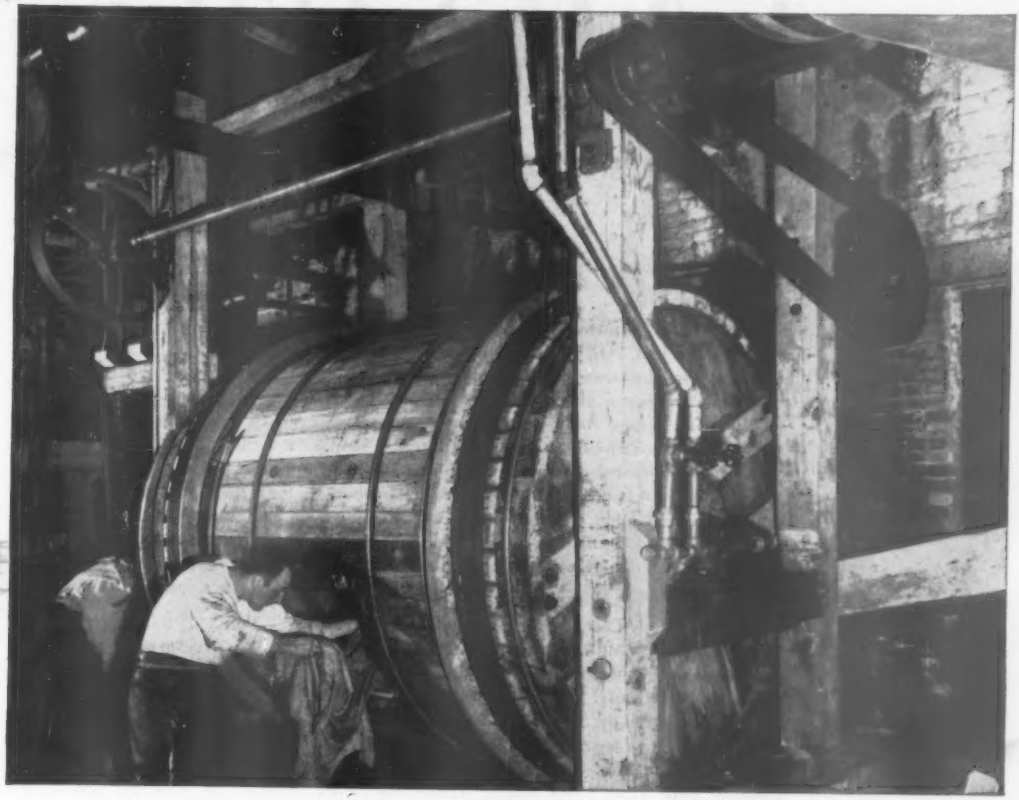
Name_____

Firm_____

Address_____

City_____ Zone____ State_____

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Two-ton drum beat soft-pedaled by rubber

A typical example of B. F. Goodrich product improvement

THEY put raw hides into that big drum and as the drum turns, the hides are tossed around in acid, being tanned for upholstery. But turning the drum was a problem. With complicated sets of gears the noise was nerve-racking, the vibration damaging to equipment. Tough on workers, expensive too.

Someone thought of using V belts to turn the drum. Engineers agreed that V belts would be quiet but knew no ordinary belt would stand the strain. Then they heard of the B. F. Goodrich grommet belt — a different kind of V belt developed and made only by B. F. Goodrich. These belts are so rugged that the engineers simply put the belts around the drum — the running belts turn it. The banging and clanking was changed to quiet rhythm and there was no more vibration — grommet belts absorbed the shaking and jerking, turning the drum like a smooth-running wheel.

A grommet is a tension member inside the belt. It's made like a giant cable except that it is endless — a cord loop made by winding heavy cord on itself. There are two grommets in a B. F. Goodrich V belt. They stand the shocks and heavy loads, also make the belt flexible.

The grommet belt is a typical B. F. Goodrich improvement — an improvement that saves money, does jobs better for industries of all kinds. It's the result of day-by-day research and it's a good reason for you to get in touch with your local BFG distributor when you need industrial rubber products. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

FACTORY

MANAGEMENT AND MAINTENANCE

COMPLETE CONTENTS • JANUARY, 1952

PAGE

special reports

How to Boost the Maintenance Department's Productivity
Thirty pages devoted to the human relations aspects of plant engineering and maintenance.

Editorial: We're Putting New Emphasis on the Human Factors 67

Introducing: FACTORY'S Panel of Eight Maintenance Experts 68

To Boost the Maintenance Department's Productivity:

1. Raise the Status of Maintenance to Lift the Department's Morale . . 70
2. Improve Union Relations to Cut Down Grievances 72
3. Adopt Pay Schedules That Fit the Job Demands 74
4. Develop Supervisors So They'll Know How to Supervise 76
5. Apply Job Standards to Measure Performance . BY ROBERT S. RICE 78
6. Train Craftsmen in Basic Industrial Skills . . . BY M. J. MURPHY 82
   CASE STUDY: Craftsmen Help Train Themselves BY HOWARD A. PILKEY 84
7. Improve Work-Planning and Controls . . . BY GEORGE N. COLLINS 88
   CASE STUDY: System Cuts Costs in Small Plant BY RICHARD E. NEUMAN 92

production

For Space at Low Cost, a Balcony May Be Your Answer 97

Four Materials Handling Ideas Pay Off Fast . . . BY W. R. STEINBERGER 104

How to Get the Most Out of Equipment Dollars BY R. BURT SCHULTZE 106
Reading test based on this article, page 260.

Is Steel Scrap Really So Scarce, Mr. Wolcott? . . . BY R. W. WOLCOTT 114

10 Ways to Save or Salvage Scarce Materials . . . BY J. W. ARVOUR 116

Why Our Man-Hour Output Climbed 2½ Times BY HOWARD G. ENGLER 112

Improve Your Time Study Rating Above and Below Normal BY S. M. DIX 124

Quality Control Indicators Cut Rejects—Fast 128

British and German Ideas for Damage Control in Wartime 134

plant engineering and maintenance

How to Boost the Maintenance Department's Productivity
See SPECIAL REPORTS

Discharge of Water Through Pipes and Valves . *Maintenance Data Sheets* 136
For other articles dealing with plant engineering problems, see pages 97, 106, 114, 116, 134, 274—*plus departments.*

industrial relations

Why Lewyt Dropped Merit Rating for Foremen—and What It's Doing Instead . . . . . BY ALEX M. LEWYT 98

"That Darned Salesman!" . . . . . BY RAY W. SHERMAN 109

A Way to Measure Results of Supervisory Training BY ROBERT B. WYLAND 110

Facts You Need to Know About Job Evaluation Plans . BY R. C. SMYTH 118

We Gave 1004 Pints of Blood . . . . . BY WELDON R. MONSON 140

"Speak Up, Management!" . . . . . REVIEWED BY CARROLL W. BOYCE 274

How to Plan Your Plant Movies . . . . . BY J. J. JEHRING 294

FACTORY MANAGEMENT AND MAINTENANCE
January, 1952 . . . . . Vol. 110, No. 1
(a consolidation of Factory and Industrial Management, including Factory, and Maintenance Engineering) Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw(1860-1948), Founder. **Publication Office: 330 W. 42nd St., New York 36, N. Y.**

Executive, Editorial, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y.

Curtis W. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscriptions: Address correspondence to Factory Management and Maintenance—Subscription Service, 330 W. 42nd

THE MAGAZINE
OF PLANT MANAGEMENT
FOR 59 YEARS

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

departments		PAGE
	Washington Report	*after* 64
	Looking Ahead in Labor	*before* 65
	Looking Ahead in Business	*before* 65
	Ideas of the Month	102
	Operating Shorts	112
	Tips to Good Human Relations	126
	Best Catalogs of the Month	131
	Joe's Electrical Department	132
	Maintenance Pointers	142
	What's New in Equipment	146
	Practical Labor Relations	202
	Plant Engineering Problems	228
	You Mustn't Miss	236
	New Materials	266
	Books and Booklets	274
	Industrial Films	302
	Letters to the Editor	309
	Behind the Byline	310

COMING IN FEBRUARY

Production . . .

Pallets and fork trucks double per-square-foot storage in a new warehouse. . . . Better production methods eliminate steel scrap before it is produced—and improve quality in the bargain. . . . A new analysis form for time study men automatically focuses attention on "better methods" possibilities. . . . Better materials handling improves maintenance service.

Plant engineering and maintenance . . .

Modernization of plant elevators eliminates bottlenecks. . . . Measuring oxygen instead of CO_2 to get maximum efficiency from your burners. . . . A maintenance program for stainless steel that's tailored to help beat defense shortages. . . . Selenium rectifiers can help solve your d-c problems.

Industrial relations . . .

Two-part safety program cuts accident frequency 84% in two years. . . . Four kinds of absentees—and what to do about them. . . . A prescription for improving community relations that any size plant can use. . . . How to make an industrial vision program pay off.

Publisher
ALFRED M. STAEHLE

Editor
HARRY LEE WADDELL

Managing Editor
LEWIS K. URQUHART

Assistant Managing Editor
J. H. McKEE, Jr.

Associate Editors
ROBERT S. RICE, Industrial Production
CARL G. WYDER, Maintenance
J. W. ST. ANDRE, Electrical
M. J. MURPHY, Industrial Relations
CARROLL W. BOYCE, National Affairs
ROBERT A. DILLEY, Midwestern Editor
GEORGE L. SMITH, Layout

Assistant Editors
DORA MITCHELL
WALTER F. WAGNER, Jr.
EUGENE F. McGARVEY
DON BAIRD
NORMAN WEISSMAN

Staff Photographer
DICK WOLTERS

Consulting Editors
L. C. MORROW
A. H. MOGENSEN
H. P. DUTTON
CHARLES B. GORDY

Washington Bureau
GEORGE B. BRYANT, Jr., Director
J. M. GAMBATESE, Labor

McGraw-Hill Department of Economics
DEXTER M. KEEZER, Director

McGraw-Hill World News
RUSSELL F. ANDERSON, Editor
London, Paris, Frankfurt, Rio de Janeiro, Tokyo, Mexico City, Bombay, Melbourne

Advertising Sales Manager
H. R. MATHIAS

Research Manager
CHARLES S. MILL

District Managers
G. E. POMEROY, Boston
J. S. CAWLEY, G. R. RAMEL, New York
E. J. MACAULAY, Philadelphia
R. W. GARRISON, Pittsburgh
R. C. GREINER, Cleveland
T. W. VAN WINKLE, Detroit
A. B. MARTIN, R. P. ROSE, Chicago
W. R. PANKOW, St. Louis
J. H. ALLEN, Los Angeles
J. W. OTTERSON, R. E. DORLAND, San Francisco
R. C. MAULTSBY, Atlanta
J. H. CASH, Dallas
Other offices at Washington and London

St., New York 36, N. Y. Allow ten days for change of address.

Factory Management and Maintenance solicits subscriptions only from production, maintenance, and management executives, and engineers in manufacturing plants. Please indicate company connection and title on all subscription orders.

Single copies, 50¢; in Latin America, 75¢; in all other countries, $1.50. Subscription rates — United States, U. S. possessions: $3, 1 year; $4, 2 years; $5, 3 years. Canada: $5, 1 year, $8, 2 years; $10, 3 years. Pan-American countries: $6, 1 year; $10, 2 years; $12, 3 years. Other countries: $15, 1 year; $25, 2 years; $30, 3 years.

Entered as second-class matter July 22, 1948, at the post office at New York, New York, under the Act of March 3, 1879. Printed in U.S.A. Copyright 1952 by McGraw-Hill Publishing Company, Inc. All rights reserved.

Look into this mirror for faster production

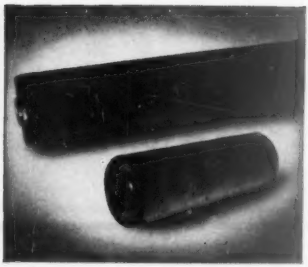
A brushing method used by a mirror manufacturer . . . or one similar to this . . . may help you improve product quality and cut rejects.

To provide a binder for the silvering compound, a base coat was formerly applied to the glass by hand. But uneven coating caused blemishes in the silver after drying. With the help of the **O**sborn **B**rushing **A**nalyst, a power brushing method with specially-engineered Osborn Heli-Master® Brushes was developed (1) to clean the glass thoroughly with water and (2) to *brush on* the base coat in a perfectly uniform film. Results: Blemishes in silvering practically eliminated. Mirror production has been stepped up and rejects cut to the bone.

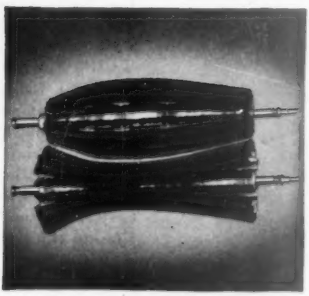
Look into the possibilities of power brushing for the improving of *your* manufacturing . . . whether it involves glass, metal, rubber, plastics or textiles. To get the help of an **OBA**, call or write *The Osborn Manufacturing Company, Dept. 598, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

OSBORN

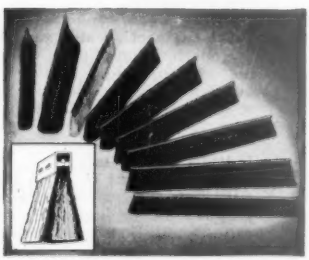
LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



FOR HIGH SPEEDS. Osborn Heli-Master® "FA" Brushes provide a continuous, uniform density of fill up to a 180″ brush face length. These can be built for many types of cleaning, scrubbing and finishing for smooth operation at speeds up to and exceeding 10,000 surface feet per minute. In wide range of fill materials for metallic and non-metallic materials.



FOR FLEXIBILITY. Osborn Rota-Master® Brushes may be used for wide-face applications such as glass washing, cleaning and unloading conveyor belts, wood staining, bus washing, rubber roughi ıg, power sweepers. Open face design affords flexibility. Density is regulated by the number of Master strips employed.



FOR MANY JOBS . . . Osborn Master* Strip Brushes can be used in special mountings for a wide variety of power-driven applications—in straight strips or wound on an arbor as for the Heli-Master or Rota-Master Brushes. Have the **O**sborn **B**rushing **A**nalyst show you how these versatile brushes can help solve *your* problems.

*Trademark

PUT YOUR PLANT

AT YOUR FINGERTIPS

WITH SIGNALING via GRAYBAR

Just flick a lever to call or talk with any key employee, anywhere in your plant! Clear, fast communication among your various departments will save many hours of time ordinarily lost in locating personnel, issuing urgent orders, and checking plant operations. Via Graybar, you can get all the proper equipment for every type of voice or code-paging requirement.

From "intercom" to siren

There's Webster Electric Teletalk, an amplified communication system that connects you directly with personnel at selected points in your plant. It relieves switchboard congestion and saves countless steps through two-way or multiple inter-office conversations. There's the Edwards Lokator, a paging system that speeds location of personnel throughout the plant. Installations can be made with a wide variety of signals — from buzzers, musical notes or silent flashing lights to bells, horns, or howlers that will penetrate any plant noise. Or you may like U.S.I. Sound-powered Telephones. For common or selective talking systems, these hand-sets transmit distortion-free conversations over long circuits without external power! A rugged weatherproof set is available with magneto howler signals. For warning, Graybar has Benjamin and Federal sirens. The coupon below will bring you details.

Expert help in planning

There are Graybar offices in more than one hundred cities. Your local Graybar Representative will give you or your electrical contractor complete information on all types of talking, calling, warning, and locating equipment. The help of a Graybar Signaling Specialist is available in choosing the best combination of devices and accessories for your particular need. We offer you similar service in the selection and procurement of supplies for lighting, wiring, ventilation, and other electrical installations.

Send coupon for folder

GRAYBAR ELECTRIC COMPANY, INC. 207-111
420 Lexington Ave., New York 17, N. Y.

Please send me your free illustrated folder, "Signaling and Intercommunication Systems for Every Need."

Name_____ Title_____

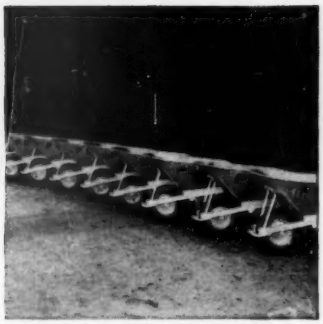
Company_____

Address_____

City_____ Zone_____ State_____

You get the best of everything electrical
Via Graybar

B.F.Goodrich

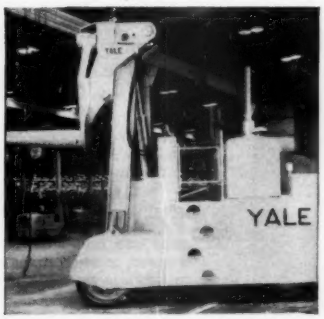


Wheelbarrows for light hauls

Moving heavy material for shipment

Simplifying storage problems

Hand trucks for intra-plant moves



Capable of handling heaviest loads

Loading heavy shipments in freight cars

BFG TIRE AND WHEEL AW ANALYSIS CAN SAVE YOU MONEY ON EVERY ONE OF THESE OPERATIONS

FOR faster, cheaper materials handling, B. F. Goodrich now offers you a tire and wheel analysis plan that's a sure, proven way to help beat rising costs, solve manpower shortages and increase output. Trained B. F. Goodrich representatives will study your operation thoroughly, make impartial recommendations regarding tire and wheel types and sizes, and also give helpful care and maintenance suggestions. This BFG service is yours for the asking—you are under no obligation whatsoever. Use the coupon for complete information.

A similar program is available for manufacturers of industrial hauling equipment.

only B. F. Goodrich has a complete line of industrial tires.

The B. F. Goodrich Co.
Department TW-151
Akron, Ohio

Please give me additional information on your new Tire and Wheel Analysis plan.

Name_____

Title_____

Company_____

City_____ State_____

Who Profits Most from the sale of a BAKER TRUCK?

MANUFACTURER? TRUCK SALESMAN? BUYER?

YOU BE THE JUDGE:

- Some time ago a **PUBLISHER** faced the need for more storage space. A Baker Truck saved him the cost of building a new warehouse by better utilization of available space, and in addition paid for itself out of savings in a few months by cutting handling costs.
- **A METAL FABRICATING PLANT** cut loading and unloading costs 75% with a Baker Truck. At the same time it eliminated the necessity for interrupting production to build a ramp and dock which would have cost the company many thousands of dollars more than the investment in the truck.
- **A CHEMICAL PLANT** quadrupled its volume without adding to its handling labor staff or warehousing capacity.
- **A SOFT DRINK BOTTLING PLANT** is saving $4,000 per 24-hour day by improved handling methods with two Baker trucks.
- In a **STEEL WAREHOUSE**, 3 men and a Baker Truck now handle work formerly requiring 6, 8 and 10 men—often with overtime.

- A large **ELECTRICAL MANUFACTURER** saves $10,000 per year in scrap-handling costs with this Baker Fork Truck with revolving head. The company earns an additional bonus of $10,000 per year by getting a better price for the scrap when sold.

These are but a few of the thousands of case histories, proving that the Baker customer profits most. Our profit and the salesman's commission are relatively small, one-time earnings. But our customers earnings go on year after year—often for more than a quarter of a century on a single investment.

Let us demonstrate
HOW BAKER TRUCKS CAN MAKE PROFITS FOR YOU

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
1218 WEST 80th STREET, CLEVELAND 2, OHIO • *In Canada: Railway and Power Engineering Corp., Ltd.*

Baker® INDUSTRIAL TRUCKS

Here's how you can tell the chain with SHOT-PEENED rollers...

Thousands of tiny steel balls hammer the metal — "cold work" each roller . . . pay off in extra fatigue life . . . added ability to withstand shock and impact.

...the chain that has extra fatigue life

YES, you want to be sure you get shot-peened rollers on the next roller chain you buy. Shot-peening gives rollers the extra fatigue life needed to take repeated shock and impact loads.

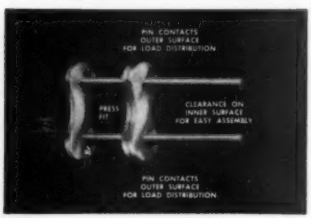
These chains are high in tensile strength, durable under severe loads, relatively light in weight and uniform in pitch. This accounts for their wide acceptance throughout industry for both drive and conveying purposes.

Thanks to constant research and precise manufacturing controls, every Link-Belt Precision Steel Roller Chain meets the highest standards for uniform strength. You get a positive, long-life drive — unaffected by heat, cold or moisture.

Link-Belt Roller Chain is available in single or multiple widths, in ⅜ to 3 in. single and double pitch. For all the facts, call your Link-Belt representative or write direct.

LINK-BELT

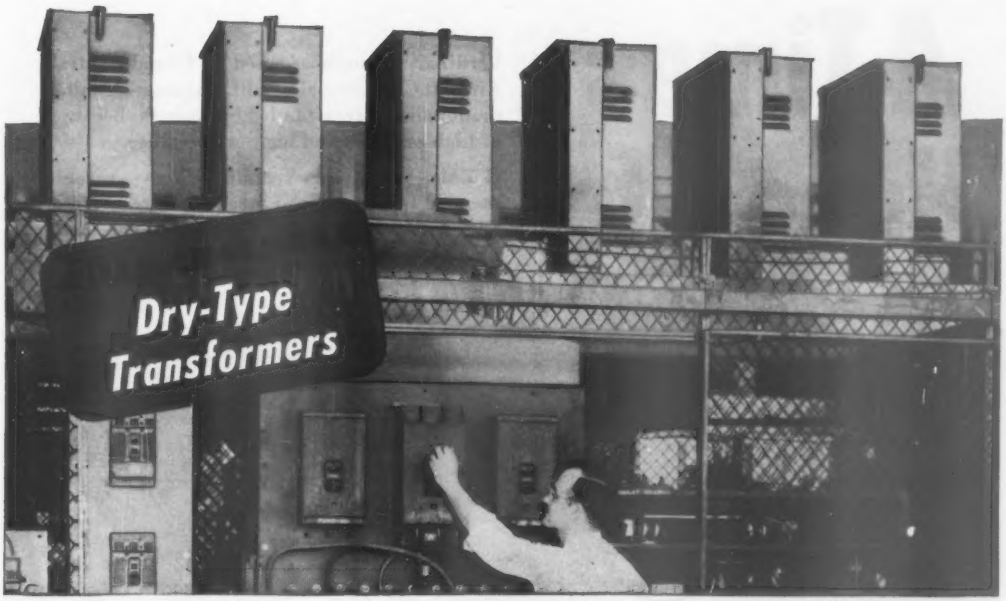
PRECISION STEEL ROLLER CHAIN



Easier coupling
and uncoupling without sacrificing load distribution

Patented E-Z Assembly feature of Link-Belt Precision Steel Roller Chain has won world-wide approval. Coupling and uncoupling of multiple width chains — right on the job — is far easier. There's absolutely no sacrifice of load distribution . . . no loss of the chain's remarkable performance. Press-fits between chain pins and middle bars have been modified. But full load carrying capacity across the entire width of the chain has been maintained.

LINK-BELT COMPANY: Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities. 12.332



This bank of 37.5 kva dry-type transformers supplies power to a test panel. Wherever lighting is altered or machines are relocated, "dry-types" can be moved quickly.

Short Cut
TO QUICK PLANT CONVERSION

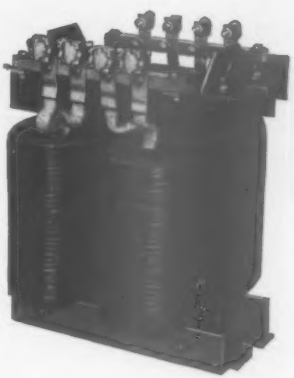
ON THE TEST FLOOR of a large Midwest manufacturer, this bank of 37.5 kva dry-type transformers supplies voltage for accurate switchgear testing. Combinations of 60 and 110 volts up to 2200 volts are used for switchgear durability, rupture, life and heat tests. But in spite of almost continuous service since November, 1942, the transformers required virtually no maintenance.

As this company found, the light, portable Allis-Chalmers dry-type transformer is a convenient means of putting power close to the load without loss of time or trouble. Because it speeds changeovers on lighting and power services, it prevents costly delays in supplying correct voltage to lighting, motors or heating equipment. At the same time it eliminates long, expensive secondary feeders and hard-to-get copper.

That's why the A-C dry-type transformer can help in making emergency rearrangements of plant layout or of spotting power for relocated machines. The Allis-Chalmers dry-type transformer is easy to install. Solderless connectors on popular sizes reduce hook up time to minutes.

Allis-Chalmers general purpose dry-type transformers are built in single phase sizes — 200 kva and smaller; three phase sizes — 300 kva and smaller, 600 volts and below. For more information consult your A-C sales office, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for bulletin 61B6382A.

A-3441



ALLIS-CHALMERS A-C ALLIS-CHALMERS

4 Times Hose Life

Ordinary steam hose, used by Grand Central Aircraft Co., Glendale, Calif., in steam-cleaning moth-balled aircraft failed in 6 months because of high pressure and high temperature.

G.T.M. — Goodyear Technical Man — recommended HD Glass Cord Steam Hose reinforced with braided charproof glass fiber. This hose has served over 2 years, 20 hours a day—*four times the service.*

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified HD GLASS CORD STEAM HOSE
for high-temperature-pressure service
A
B
C
A—Heavy-gauge, heat-resistant tube remains soft and flexible at high temperatures.
B—Glass cord "flexible-braided" body is noncharring; handles 200 lbs. psi steam pressure.
C—Tough, sturdy cover provides maximum protection.

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network

Small Component... or Complete Unit... You* can count on getting whatever You* need—

Added Evidence that—

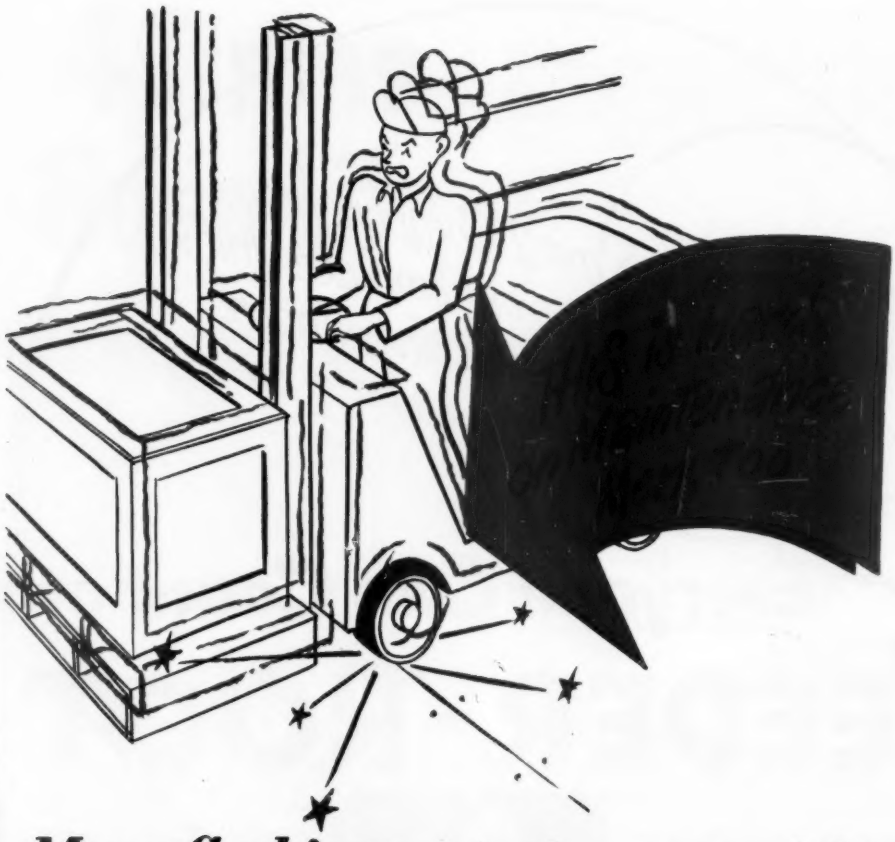
Everyone Can Count on VEEDER-ROOT

This REEL CONTROL BOX, complete with its *built-in* counting mechanism, indicates the number of feet of antenna reeled in and out of certain types of military aircraft. Manufactured completely by Veeder-Root, including outside bakelite cover and box, this unit shows another imaginative application of the universal language of direct-reading *Count*rol.

Now if you, *in any of your defense work,** have a counting problem, then you can count on Veeder-Root to help you in every possible way.

VEEDER-ROOT INCORPORATED
"The Name That Counts"
HARTFORD 2, CONN. • GREENVILLE, S.C.
Montreal 2, Canada • Dundee, Scotland
Offices and agents in principal cities

"Counts Everything on Earth"



Mono-Cushions® cut the cost of bumps

MONO-CUSHIONS ARE EASY ON MAINTENANCE MEN—These big, burly cushion tires literally soak up jolts and shock, reducing maintenance as much as 40% on driving trains, steering assemblies, bearings, and all parts of the vehicle affected by shock and shock load.

Mono-Cushions are easy on loads, floors, and drivers, too. They cushion the ride both ways, reducing load breakage and floor wear. They ride beautifully, handle beautifully, keeping drivers comfortable and alert. Mono-Cushions are sure-footed, stable on the high lifts.

The leading manufacturers of materials handling vehicles use Monarch Tires as original equipment. The manufacturer of your vehicles can supply you, through his distributors, with Monarch Tires engineered for your application.

THE
MONARCH
RUBBER COMPANY
350 LINCOLN PARK • HARTVILLE, OHIO

SPECIALISTS IN INDUSTRIAL SOLID TIRES AND MOLDED MECHANICAL RUBBER GOODS

Die Handler

Pallet Retriever

Upender

Cable Reel Handler

Side Dump Revolving Unit

Roll Handler with Apron

Tin Plate Clamp

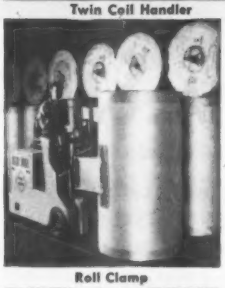
Bale Clamp

Twin Coil Handler

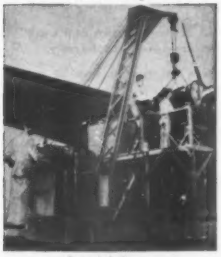
Rotary Scoop

Roll Piercing Truck

3-Ton Low Lift; 1-Ton Crane



Roll Clamp



Special Crane

Drum Handler

Is the answer to your SPECIAL handling problem illustrated?

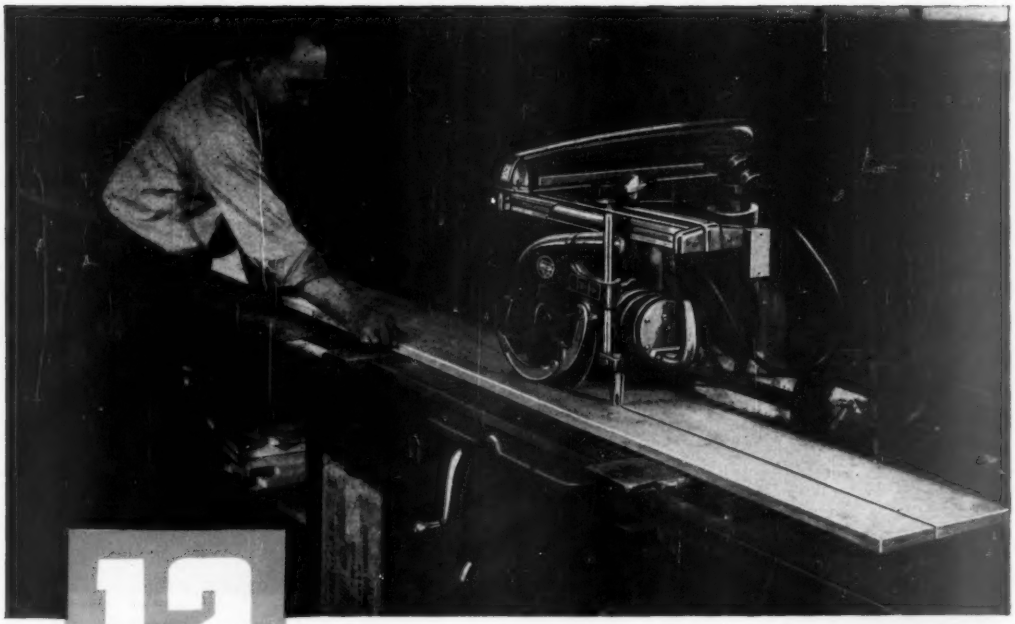
Only a FEW examples of Elwell-Parker's ingenuity and enterprise in meeting unusual materials handling requirements are shown . . . Not infrequently, the peculiar shape or nature of a load makes a standard truck impractical. In specially designing attachments or units for such needs, Elwell-Parker draws on its 45 years of experience, supplying power trucks for over 300 industries . . . From its line of 87 different sizes and types, Elwell-Parker can usually select a truck already designed for the job. If not, ask your man about a special unit "tailored" precisely to your needs. The Elwell-Parker Electric Co., 4020 St. Clair Avenue, Cleveland 3, Ohio.

NEW ATTACHMENT FOLDER describes and illustrates in detail the many attachments for E-P fork trucks. Write for your copy.

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

Established 1893



12 ways the DELTA RADIAL SAW can make money in your shipping room

Production profits are frequently lost *in the shipping room* because of outmoded equipment and old fashioned materials-handling techniques.

To protect your plant profits in today's markets you must gain all-around plant efficiency. This remarkable new Delta Radial Saw can be the major step in eliminating the shipping room bottleneck. Here are twelve ways it accomplishes that purpose:

1. **Reduces Equipment Investment**—one machine that does the work and saves the cost of many.
2. **Saves Floor Space**—saw is installed against a wall, so that material moves freely through the shop.
3. **Offers Exceptional Flexibility**—an all-purpose machine; you can keep it busy all the time.
4. **Reduces Set-up Time**—in a few seconds, change from cut-off to miter, to rip, etc.
5. **Saves Power Through Direct Drive Motor**—no gears, no belts, no pulleys to worry about.
6. **Increases Operator Safety**—extra safety guards; operators appreciate them.
7. **Reduces Handling Costs** — lumber always lies flat, moves on straight line to the saw.
8. **Reduces Lumber Waste** — minimum spoilage; work lay-out marks are always in plain view.
9. **Offers Increased Mobility**—a mobile power shop, easily shifted to any point in the shop for other emergency work.
10. **Simplifies Operating**—cross-cut action is "down and back" —even women operators use the saw safely, confidently.
11. **Cuts Much Faster**—Saw moves in straight line at any angle, slashes stock in seconds.
12. **Reduces Maintenance**—Delta advanced design keeps machine up to date, minimizes wear.

DELTA Another ROCKWELL TOOLS Product

Delta Radial Arm Saws are made in four sizes: from ½ HP to 7½ HP, with 8" to 20" saw blades. See for yourself how this machine can cut your shipping room costs. Ask your Delta Dealer, or write direct, for a copy of the Delta Radial Saw "Idea Book" It's packed with money saving suggestions.

There's a Delta Power Tool for Your Job.

WOOD OR METAL WORKING

53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

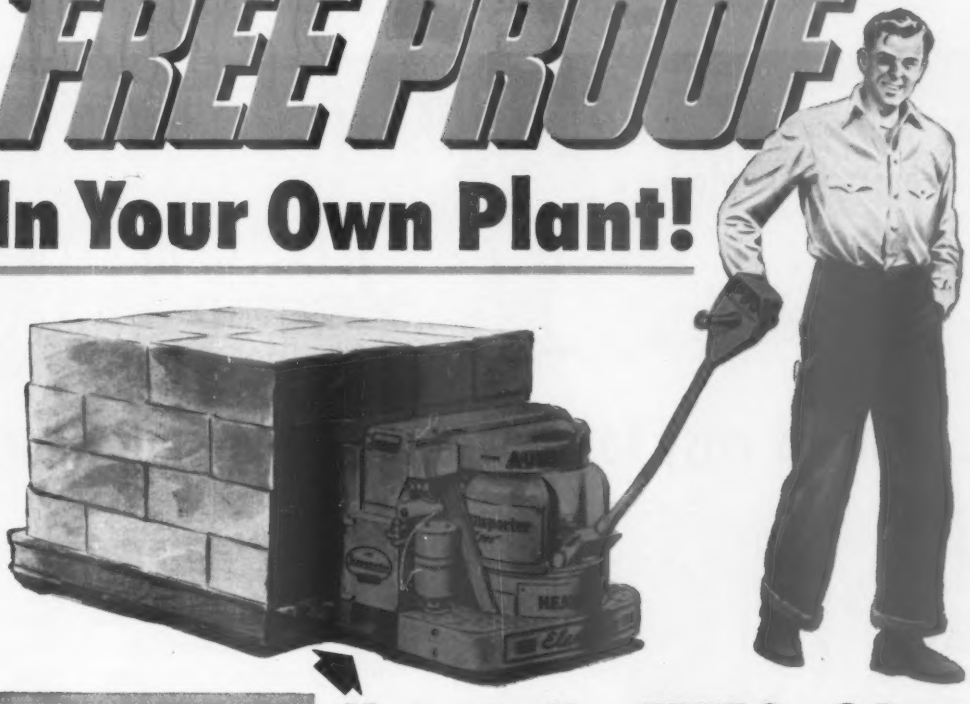
DELTA POWER TOOL DIVISION

DELTA MILWAUKEE Rockwell MANUFACTURING COMPANY

619A E. VIENNA AVE. • MILWAUKEE 1, WISCONSIN

FREE PROOF

In Your Own Plant!



MOST SENSATIONAL OFFER WE HAVE EVER MADE

to Demonstrate

It Can Cut Your Material Handling Costs

AS MUCH AS

50% OR MORE

Press-button magic moves tons with a touch-of-the-finger. One man does the work of three—eliminates back-breaking, old-fashioned hand-handling, actually releases 2 out of 3 men for more productive work. Saves as much as 50% to 75% in handling costs every working day.

Yours to Use FREE for 3 Days

TO PROVE YOU CAN ADD MAN-HOURS WITHOUT INCREASING WORKLOAD OF PERSONNEL

All industry is using this service-proved Electric Truck . . . a brawny midget of power that moves up to 6000 pounds with amazing touch-of-the-finger ease.

It's saving industry millions of dollars every year, offers many features which mean better performance, less maintenance, lower operating costs . . . extra savings in smooth trouble-free material handling.

But don't take our word for it! Put "101" Transporter to the test . . . put it over the severest hauling hurdles *in your own plant, absolutely free and without obligation!* Mail coupon and we'll arrange delivery for your 3 days' trial. First come, first served. No obligation to buy . . . no strings attached.

AUTOMATIC TRANSPORTATION CO., WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC INDUSTRIAL TRUCKS, IS A DIVISION OF THE YALE & TOWNE MFG. CO.

There are more Automatic Transporters in service today than any other operator-led Electric Truck.

"101" Transporter
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

FREE TRIAL COUPON

AUTOMATIC TRANSPORTATION CO.
39 West 87th Street, Dept. A-2
Chicago 20, Illinois

Yes, I want to put the "101" Transporter to work for me for 3 days, free of all cost and obligation. Have your representative schedule it for me.

Company Name.....

By.....*Title*.....

Street Address.....

City.....*Zone*.....*State*.....

making the right
choice is simple here

...but it's easy to go wrong in choosing floors

This greaseproof SPECIAL KENTILE Floor resists hot cooking greases and oils... cleans to colorful newness with minimum of effort and expense.

THAT'S WHY IT PAYS TO CONSULT YOUR KENTILE FLOORING CONTRACTOR

CHOOSING the wrong floor for a particular room or area all too often results in excessive upkeep costs... frequent repairs or replacement. That's why it is economical as well as practical to call in the Kentile Flooring Contractor.

He is an expert with years of experience in selecting the one right floor for every flooring need... from heavy duty greaseproof flooring required for working areas to the dignified flooring best suited for offices.

Whether your problem is new construction or remodeling of areas large or small, call in the Kentile Flooring Contractor and get the most for your flooring dollar. For his name look in your classified phone book under FLOORS or write Contract Division, Kentile, Inc., Brooklyn 15, N. Y. In Canada, at T. Eaton Co. Ltd.

KENTILE INC.

KENTILE • KENTILE RUBBER TILE
KENCORK • SPECIAL KENTILE

KENTILE, INC., 58 Second Avenue, Brooklyn 15, New York • 350 Fifth Avenue, New York 1, N. Y. • 705 Architects Building, 17th and Sansom Streets, Philadelphia 3, Pennsylvania • 1211 NBC Building, Cleveland 14, Ohio • 225 Moore Street, S.E., Atlanta 2, Georgia • 2020 Walnut Street, Kansas City 8, Missouri • 1440 11th Street, Denver 4, Colorado • 4532 South Kolin Avenue, Chicago 32, Illinois • 1113 Vine Street, Houston 1, Texas • 4501 Santa Fe Avenue, Los Angeles 58, California • 95 Market St., Oakland 4, Calif. • 452 Statler Building, Boston 16, Mass

Ready for today's great power expansion

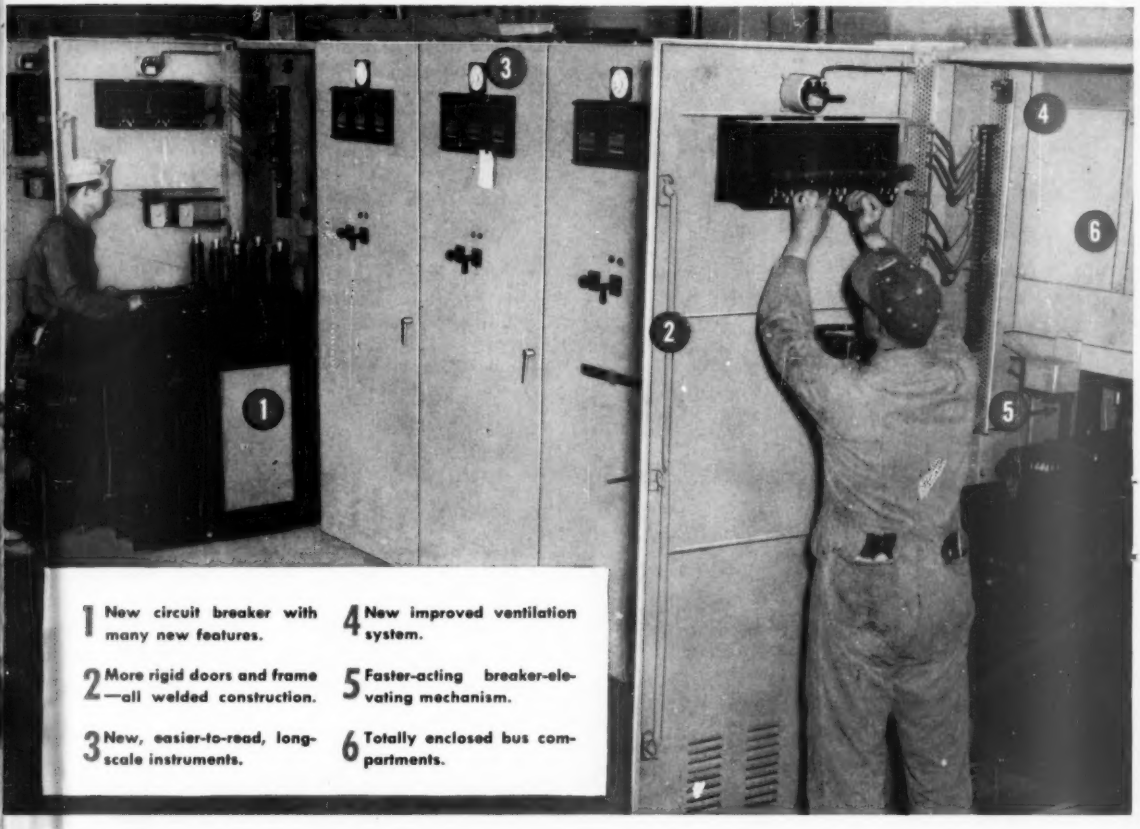
IMPROVED G-E METAL-CLAD SWITCHGEAR

...matched to today's greater "on the job" requirements, and meeting all industry standards.

Already delivered to one of America's largest and newest industrial plants, this improved G-E Metal-clad Switchgear will assure dependable power for a mammoth production job. In the foreground are the 13.8-kv G-E magne-blast circuit breakers for the Metal-clad equipments being installed.

GENERAL ELECTRIC

Improved G-E Metal-clad Switchgear


1 New circuit breaker with many new features.
2 More rigid doors and frame —all welded construction.
3 New, easier-to-read, long-scale instruments.
4 New improved ventilation system.
5 Faster-acting breaker-elevating mechanism.
6 Totally enclosed bus compartments.

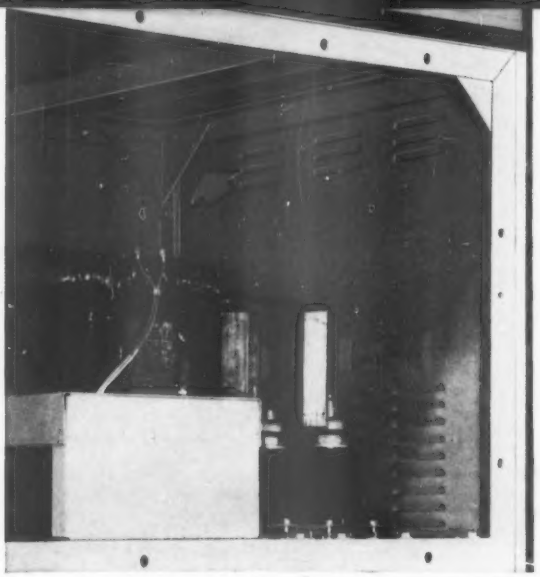
Stronger! Safer! A Wealth of New Features That Contribute to More Dependable Operation!

Pioneered by General Electric in 1935, Metal-clad Switchgear has set new standards of safety and dependability that have made it the accepted power distribution equipment throughout all industry.

Now, with new pace-setting advances in design and construction, it's better than ever, and still maintains the features of visible primary contacts when breaker is lowered to the disconnect position.

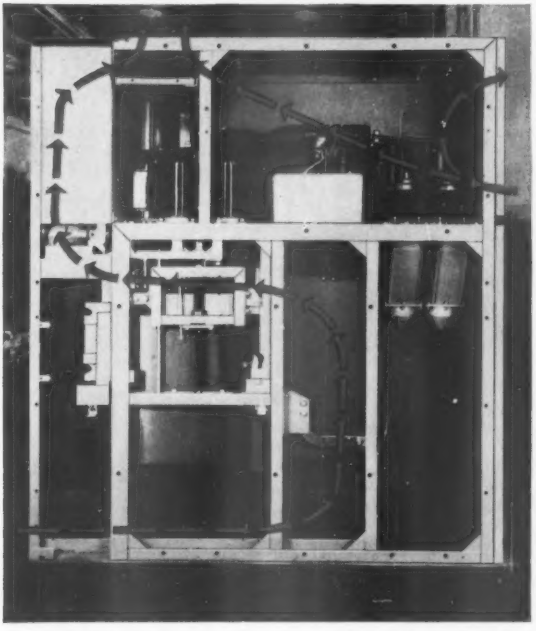
With expanding production schedules calling for more and more electric power, improved G-E Metal-clad Switchgear, in 4.16 kv and 13.8 kv ratings, gives the greatest protection against electrical shut-downs. New advanced features simplify operation and inspection, and provide increased safety for personnel. And with stronger, more rigid construction and simplified design of many components, you get even more dependability.

Only a few of the many new features can be shown here. For full information, see your local G-E Apparatus Sales representative, or write for Bulletin GEA-5664, General Electric Company, Schenectady 5, N. Y.

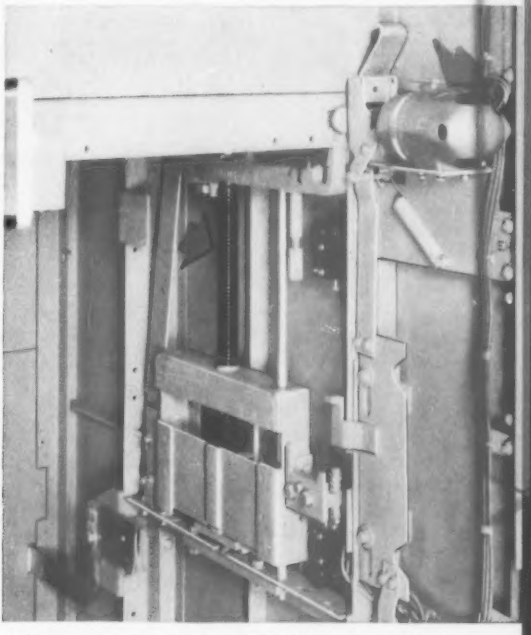


FRAME NOW COMPLETELY WELDED into one solid unit. Gusseted corners (see arrow) provide greater rigidity. Doors have a three-point latch operated from a single handle, and are reinforced against warping by a steel tube at hinge side.

REMOVABLE MAGNE-BLAST CIRCUIT BREAKER features improved flame-retardant insulation and simplified contact design. Breaker operating mechanism and control relay are on the front of breaker for easy accessibility.

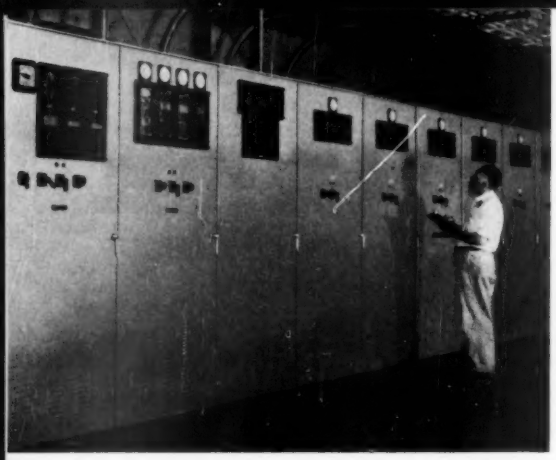


IMPROVED VENTILATING SYSTEM: Arrows show natural draft of air that constantly ventilates entire switchgear unit. The totally enclosed bus compartment, at upper left, is cooled by the circulation of air around it.

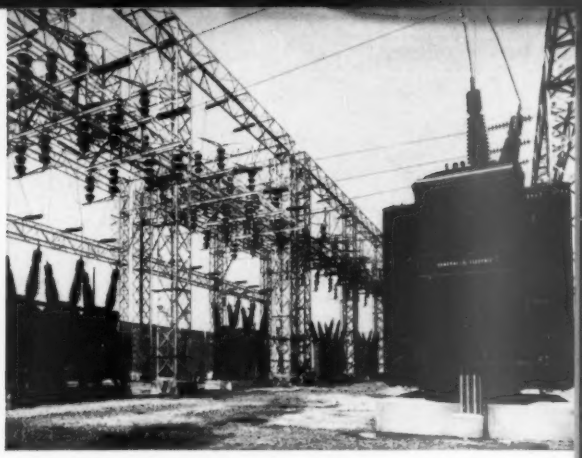


NEW FASTER ACTING BREAKER ELEVATING MECHANISM can raise the removable circuit breaker into position, or lower it for testing, in 30 seconds. A new compact gear-motor drives the simplified jack screw elevating mechanism.

GENERAL ELECTRIC



IMPROVED G-E METAL-CLAD SWITCHGEAR shown installed in new plant. Adequate interrupting capacity of circuit breakers plus total enclosure of all live parts insures maximum protection against electrical failures.



G-E OUTDOOR SUBSTATION built from standardized units, including transformer, oil circuit breakers and steel structure. Use of this equipment enabled this plant to save months in planning and installation.

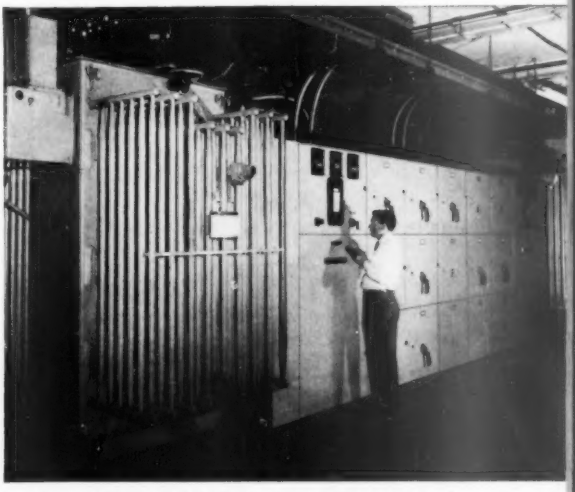
Complete Electrical System from "Packaged" equipment

...Here's the modern trend made possible with G-E equipment

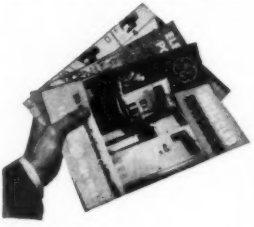
General Electric Vertical-lift Metal-clad Switchgear is only one item in a complete line of factory-assembled "packaged" equipment designed to simplify planning and speed installation of the safe, modern electrical systems required for today's expanding production.

The trend to "packaged" electrical equipment throughout the installation is illustrated by the examples shown on this page. Installed in one of the nation's newest and largest plants, each item of equipment was supplied as a ready-to-use unit. Use of standardized "packaged" equipment enabled this plant to get into production in record time.

Perhaps similar equipment can help you. General Electric engineers stand ready to assist you in solving your particular problems. General Electric Co., Schenectady 5, N. Y.



METAL-ENCLOSED LOAD-CENTER UNIT SUBSTATION, delivered as a "package," supplies low-voltage power to adjacent machines—eliminates need for long, low-voltage feeder system. Unit shown is one of 18 installed in this plant.



Complete data at your finger tips—Write for these helpful bulletins

Full information on modernizing or expanding your electrical system with G-E packaged equipment is given in these three illustrated booklets. Write for GEA-5664 "G-E Metal-clad Switchgear," GEA-3592 "Load-center Unit Substations" and GEA-5600 "Power for Industry's Third and Biggest Expansion."

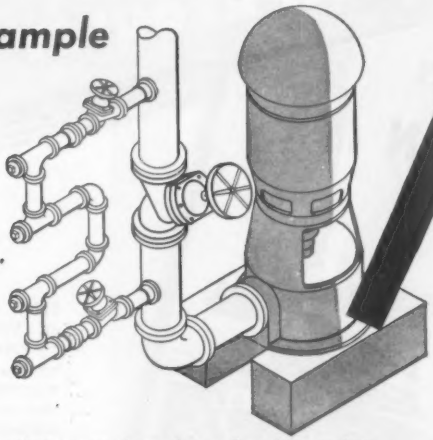
GENERAL ELECTRIC

854-42

for outstanding service

on Corrosive Well Water

...for example



The Installation—
Barr Rubber Products Co.,
Sandusky, Ohio

PROBLEM: To eliminate costly seating and packing maintenance, and frequent replacement of valves on plant well-water pump. Valves previously used highly unsatisfactory, having maximum life of 6 months.

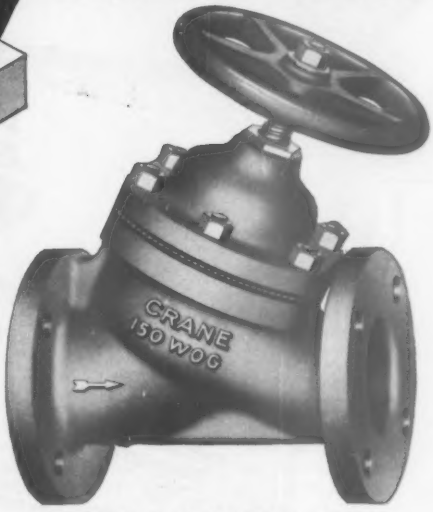
WORKING CONDITIONS: Sulphur content of water extremely high. Valve constantly exposed to severe corrosive and erosive effects. Operated infrequently; yet easy operation, positive seating are prime requisites.

SOLUTION TO PROBLEM: Crane Packless Iron Body Diaphragm Valves featuring separate disc and diaphragm design. Three-inch No. 1611 flanged end valve on main discharge; ¾-inch No. 1610 screwed end valves on by-pass.

RESULT: While other valves lasted only 6 months or less, Crane Diaphragm Valves show no effects of service, after more than a year. They operate smoothly . . . seat tightly . . . no maintenance whatsoever needed to date!

Another typical demonstration of superior quality, and the low-cost performance of Crane Valves. That's why . . . More CRANE VALVES are used than any other make!

...Choose Dependable CRANE VALVES



No. 1611 Crane Iron Body Diaphragm Valve —one of a full line suited for many services. Literature on request from your Crane Branch or Crane Wholesaler.

CRANE CO.

General Offices:
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

SEND for this booklet on Vibration Control by Vibra-Mounts. It describes the new, simple, economical way to obtain up to 85% reduction in transmitted vibration, increasing plant efficiency, protecting machines, instruments, buildings and personnel. Vibra-Mounts can be installed quickly by superintendents and maintenance men.

American Felt Company
TRADE MARK

GENERAL OFFICES: 64 GLENVILLE ROAD, GLENVILLE, CONN. ENGINEERING AND RESEARCH LABORATORIES: Glenville, Conn.—PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.; Westerly, R. I.—SALES OFFICES: New York, Boston, Chicago, Detroit, Cleveland, Rochester, Philadelphia, St. Louis, Atlanta, Dallas, San Francisco, Los Angeles, Portland, Seattle, San Diego, Montreal.

"The Odds are 4 to 1

You Can Cut Your Painting Costs With The On-The-Wall Test"

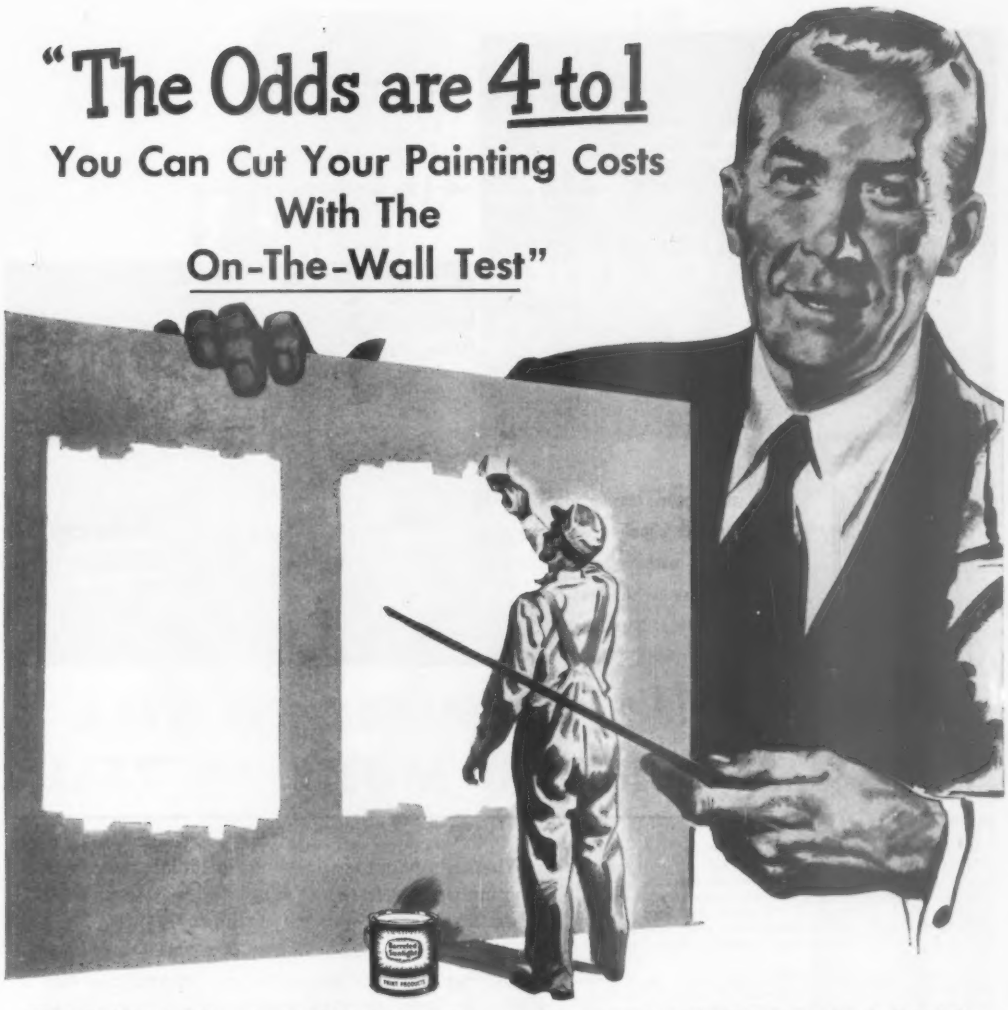


Figure it this way. Labor represents 80% of the average cost of maintenance painting . . . four times the cost of the paint. So if you're looking for savings . . . real savings . . . make this simple test.

Take two equal wall areas in your building and let your painter paint one with Barreled Sunlight and the other with any other good brand of paint . . . both paints thinned according to directions, of course. Clock the time it takes to paint each area and see how much faster and better your painter can work with Barreled Sunlight. Project the time he saves with Barreled Sunlight into terms of a complete painting job, and you'll realize that you can enjoy the long-lasting quality of famous Barreled Sunlight *and still save money on your painting costs.*

Yes, you may pay a little more per gallon for Barreled Sunlight but it will go farther and faster on the wall. It will give you a better-looking, longer-lasting paint job *for less money than any other paint on the market.* Let our representative help you make this money-saving test. Write and he'll call.

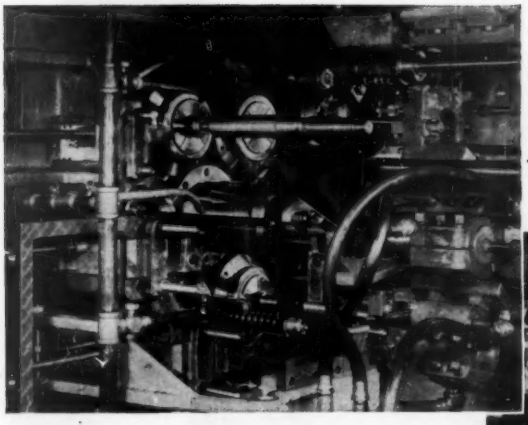
BARRELED SUNLIGHT PAINT COMPANY, 2-A Dudley St., Providence, R. I.

Barreled Sunlight *Paints* ®

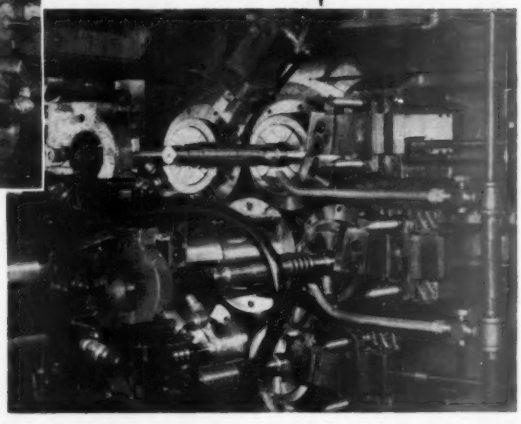
In whitest white or clean, clear, wanted colors, there's a Barreled Sunlight Paint for every job

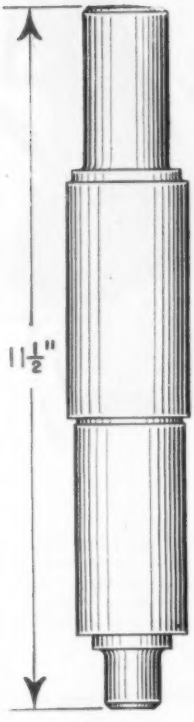
IT ALWAYS COSTS MORE NOT TO PAINT!

For over half a century the symbol of quality and dependability among paint buyers for leading industrial, institutional and commercial buildings



Tooling Area 3½-SIX
Front Side Rear Side





Automotive Transmission Shaft

A very good reason why CONOMATICS handle a wider variety of machining operations per single chucking is their greater number of tooling positions.

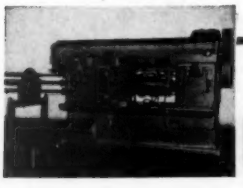
WITH MORE TO SELL THERE'S MORE TO TELL

Whether you're selecting a new golf club, motor car, or multiple spindle bar automatic, you want what best fits into the "scheme of things."

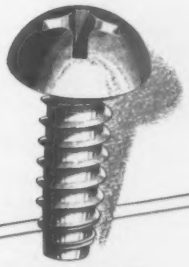
Before you can be sure that any product will meet your requirements you must have information. And you can judge only by that at hand or available. Complete information lets *you* decide what's important to *you.* That's as it should be.

There's always more information to be had about the product that has more to offer. It's that way about CONOMATICS. And you can always have *complete* information. If you will write, wire, or phone, you can have it now.

A Comparison of ALL Automatics is in favor of Cone



Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



THIS IS AMERICAN

TYPE B TAPPING SCREW

For Assembling Heavy Sheet Metal

Designed with threads of finer pitch for fastening sheet metal from .050″ to .200″ thick, American Phillips Thread-Forming Screws are die-pointed for easy entrance through a clearance hole in one sheet. *And they form their own threads* as they join the two sheets firmly together. What's more, they bring these same advantages to the assembly of fibre, asbestos, and certain types of plastics, as well as light-metal castings.

These Type-B Screws turn still another page in the catalog of the complete American line of screws, bolts and "Hi-Shear"* rivet pins. *Buy American* . . . and get firmer, faster fastenings all along the line.

*Trademark Reg. U. S. Pat. Office

AMERICAN SCREW COMPANY

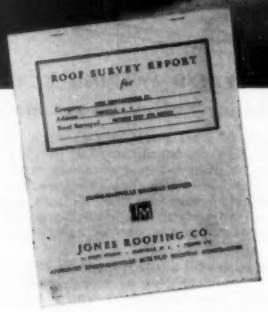
PHILLIPS HEADquarters

WILLIMANTIC, CONNECTICUT

Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.

DON'T TAKE YOUR ROOF FOR GRANTED

Get a Roof Survey Report *free* of charge!



The Built-Up Roof Survey Report tells exactly what condition your roof is in, gives you a permanent record, helps you plan ahead for roofing maintenance. Get this *free* survey made *now!*

Even though your roof doesn't *seem* to be leaking, it may be in need of attention. Many a roof with torn flashings, dried-out felts, even rotted decks has been assumed to be in "good condition."

To anticipate costly damage, often hidden, and numerous repair bills, hundreds of plant engineers and maintenance executives have already used the free Johns-Manville Roof Survey Report.

The Roof Survey Report is an accurate picture made by a roofing *expert*, the J-M approved Built-Up Roofing Contractor. It covers all critical areas —flashings, decks, roofing felts, parapet walls, skylights, etc. And it will cost you only the trouble of asking for it.

Let us send you the interesting booklet, "Things You Should Know About Your Roof." It gives complete information about the *free* J-M Roof Survey Plan together with the full story of J-M Flexstone* Asbestos Roof and the Asbestile* Flashing System. Write Johns-Manville, Dept. FM, Box 158, New York 16, N. Y. In Canada, write 199 Bay St., Toronto 1, Ontario.

*Reg. U. S. Pat. Off.

Mail your Request today

Johns-Manville, Box 158,
Dept. FM, New York 16, N. Y.

Please send me the free booklet, "Things You Should Know About Your Roof", and have your Approved Built-Up Roofing Contractor see us about making a free survey.

Name_____

Address_____

_____

Made of ASBESTOS

Johns-Manville FLEXSTONE Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS

DECORATIVE FLOORS • MOVABLE WALLS • ETC.

Towmotor Certified Job Studies show how other companies in *your* industry, with problems just like *your* problems, have cut production costs, increased output per man-hour, handled more tonnage . . . SAVED MONEY IN EVERY WAY . . . with Towmotor Mass Handling. Packed with helpful information, and illustrated with on-the-job photos, Towmotor Certified Job Studies clearly picture BIG SAVINGS on those jobs with which YOU are most familiar.

Look at these typical TOWMOTOR SAVINGS

- *Car unloading costs cut as much as 70% in many plants*
- *A big appliance manufacturer cut handling costs 65%*
- *75% of floor area saved with high stacking*
- *Breakage eliminated in a bottled goods plant*
- *Carloads of steel unloaded in 1¼ hours—saving 87%*
- *A retail warehouse saves $635 weekly*
- *A canned goods warehouse cut car loading costs 75%*
- *An auto. parts maker saves 160 man-hours weekly*
- *Storage capacity doubled in many warehouses*

See how YOU can reduce costs in all phases of Receiving, Processing, Storage and Distribution. Write today for Job Studies covering your industry.

TOWMOTOR CORPORATION, DIV. 5
1226 E. 152ND STREET, CLEVELAND 10, OHIO
Representatives in all principal cities in U. S. and Canada

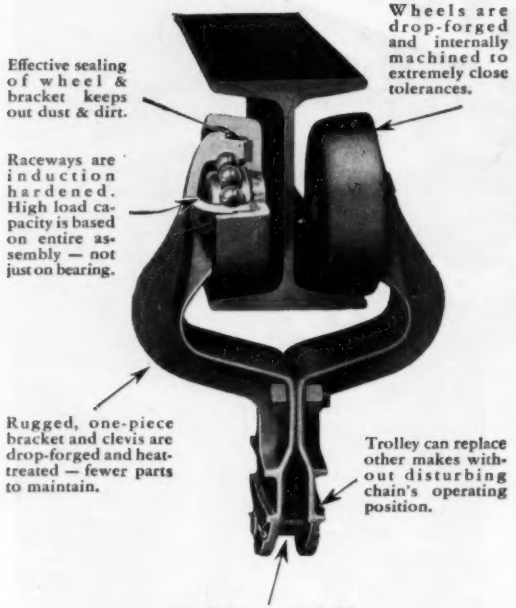
TOWMOTOR
THE ONE-MAN-GANG

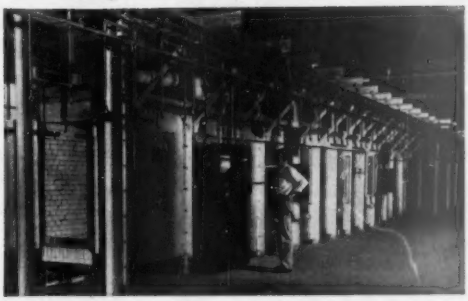
FORK LIFT TRUCKS and TRACTORS
RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT AMERICANISM TODAY?

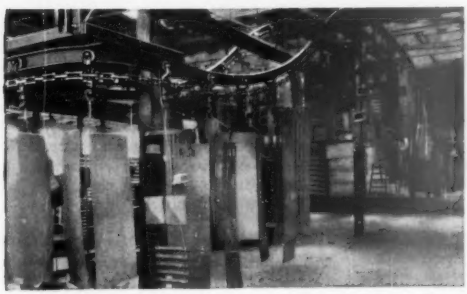
When you buy TROLLEY CONVEYORS why not get BOTH?

Superior components PLUS Engineering ingenuity


Wheels are drop-forged and internally machined to extremely close tolerances.
Effective sealing of wheel & bracket keeps out dust & dirt.
Raceways are induction hardened. High load capacity is based on entire assembly — not just on bearing.
Rugged, one-piece bracket and clevis are drop-forged and heat-treated — fewer parts to maintain.
Trolley can replace other makes without disturbing chain's operating position.
Clevis pins are locked in bracket, cannot rotate. Bracket wear is minimized.



Enameled pieces are transported on a Link-Belt Overhead Trolley Conveyor through a 58-foot furnace which operates at temperatures up to 1600° F.



After leaving the bake oven, these parts for filling-station pumps are circulated on a Link-Belt Overhead Trolley Conveyor until thoroughly cooled.

You can make your overhead trolley conveyor dollars go farther by calling in Link-Belt while you're still in the planning stage. Link-Belt makes the finest trolley on the market today. Equally important, our specialists can draw on the world's largest, most varied background of conveying and power transmission application.

Bringing parts to workers and taking them away. Drawing raw materials from stock at correct intervals. Synchronizing operations to eliminate bottlenecks.

Link-Belt Overhead Trolley Conveyors do all these jobs to release valuable manpower for productive work . . . to increase output. And they free floor space, too.

Why not have a Link-Belt engineer help you and your consultants plan peak production results? Write for Book 2330 for all the facts.

LINK-BELT

OVERHEAD TROLLEY CONVEYORS

LINK-BELT COMPANY: Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities. 12,411-B

NEW

FREE UNISTRUT CONSTRUCTION CATALOG!

With UNISTRUT you can build all types of framing, mounts, shelving, racks, tables and benches—conduit, cable, pipe and tubing hangers and supports—fluorescent fixture supports, and many other structures with just a hacksaw and a wrench.

UNISTRUT is metal channel with a continuous slot. You simply insert the UNISTRUT spring-held clamping nut into the channel at approximate point where attachment of another framing fitting is desired, slide to exact location and bolt to UNISTRUT fitting.

UNISTRUT includes concrete inserts, roller pipe supports, brackets, clamps and many other standard parts which in combination provide the world's most flexible system of support or suspension. UNISTRUT does the complete job—you need no other parts or materials.

UNISTRUT is trim framework—provides great strength without bulk. It's easy to work with, lasts indefinitely, and the finished structure assures neat and orderly appearance.

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd., Chicago 7, Ill. Dept. M-1
Representatives and Warehouse Stocks in Principal Cities
Consult your Telephone Directories

U.S. Patent Numbers
2327587 2363382
2329815 2380079
2345650 2405631
2541908
Other Patents Pending

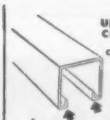
UNISTRUT IS *Bonderized!*

The World's Most Flexible All-Purpose Metal Framing

Please send items checked below, without obligation:
☐ Catalog 700 ☐ 24" x 36" Wall Chart
☐ Free Unistrut Sample

Name_____
Company_____
Address_____
City_____ Zone____ State_____

Only **UNISTRUT**
GIVES YOU THIS FAST CLAMPING, LOCKING ACTION AND THIS COMPLETE ADJUSTABILITY AND RE-USABILITY

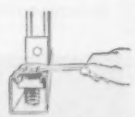


1 WEDGE SHAPED INTURNED EDGES TO TAKE SERRATED GROOVES OF UNISTRUT NUT.

2 SERRATED GROOVES "BITE INTO" INTURNED EDGES OF CHANNEL FOR POSITIVE CLAMPING ACTION.

3 INSERT SPRING NUT ANYWHERE ALONG CONTINUOUS SLOT OF CHANNEL ...

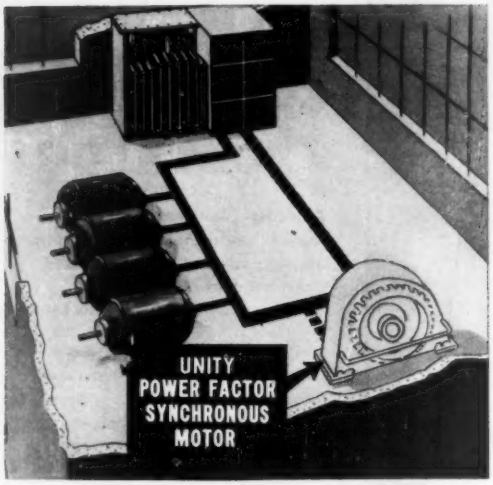
4 ROUNDED EDGES OF NUT PERMIT EASY INSERTION. SPRING ITSQUE TWIRD HANDI HOLDS NUT SNUGLY IN PLACE FOR BOLTING.

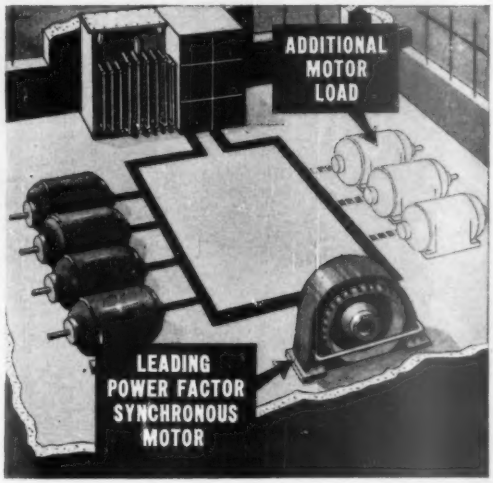

5 ASSEMBLE FITTING, NUT AND BOLT — A TURN OF THE WRENCH, IT'S DONE.

UNISTRUT PRODUCTS COMPANY

How to get more out

. . . . *install G-E Synchronous Motors*





If your plant power system is loaded close to full capacity and you have a place where a large constant-speed motor can be used, you may be able to install a *unity power-factor* synchronous motor without increasing the kva load on your system.

Or, if your power system is already overloaded, then a *leading power-factor* synchronous motor can actually supply kvars to your system while performing its usual drive duties. Then you can often install additional inductive apparatus to an existing system without fear of overloading feeder lines.

If you are planning plant expansion or you need more motors and/or suspect power system overloading, contact the nearest G-E sales engineer. He'll help you survey your system, and help you determine the type of synchronous motor you need—should this be one answer to your power system problems. *General Electric Company, Schenectady, N.Y.*

NEW! A Helpful Training Course on Motors!

Everyone concerned with technical training problems will want this new G-E Motor Selection and Application Course. Consists of 9 short, easily understood lessons. Complete kit—slide films, review booklets and instructor's manual—$100. Call or write your nearest G-E sales office, or send for free copy of 96-page instructor's manual.

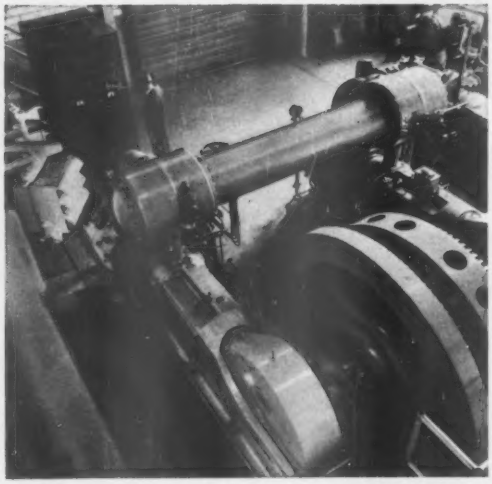
Look at the scope of this Course

1. Fundamentals of Motors
2. Types of Motors
3. Fundamentals of Selection
4. A-c Induction Motors
5. Single-phase Motors
6. D-c Motors
7. Synchronous Motors
8. Adjustable-speed Drives
9. Gear Motors

GENERAL ELECTRIC

# of your power system

for unity and leading power-factor drives



Control, too, will protect your system—G-E Limitamp high-voltage control provides ample interrupting capacity, protection for operating personnel, good appearance, and compactness. Here it controls and protects a 350-hp G-E synchronous motor.

G-E SYNCHRONOUS MOTORS ARE DRIVING . . . .

pumps	*saws*
compressors	*generators*
Jordans	*rolling mills*
beaters	*pulp refiners*
crushers	*chippers*
ball mills	*flour mills*
tube mills	*stock refiners*
large conveyors	*line shafts*
blowers	*fans . . . .*

in all types of industries where their efficiency, low first cost, and reliability make them exceedingly popular.

Check power factor on individual circuits—**easily, quickly—with new G-E hook-on power-factor meter. This portable instrument hooks around the line—no cutting of conductors, no costly shutdowns to make power checks. You can accurately locate those circuits where corrective action is needed.**

General Electric Co. Sect. AC 770-25
Schenectady 5, N. Y.

Please send me the following literature. . .

- ☐ for reference purposes
- ☐ for planning an immediate project

( ) GER-234—Synchronous Motors Do Two Jobs at One Time
( ) GEA-5332—Low-speed Synchronous Motors
( ) GEA-5426—High-speed Synchronous Motors
( ) GEA-5469—G-E Testing Instruments
( ) GEZ-310—Motor Training Course Instructor's Manual

Name .....

Company .....

Address .....

City ..... State .....

mail this coupon today

ACROSS-THE-LINE STARTERS are easy to install and wire—compact enough to be installed on or near the controlled machine. Manual Starters in sizes 0 and 1, Magnetic in sizes 0-7 for motors from fractional to 600 hp, Combination in sizes 0-5. General Purpose and special enclosures to fit every need.

REDUCED-VOLTAGE STARTERS are used where the power system has insufficient capacity for full-voltage starting . . . to safeguard machinery or processes from high starting torque or current intrush. Choose from autotransformer, reactor and resistor types. Wide line available.

STARTERS for

Choose From This Wide Selection of Generously Designed Starters . . . Backed by Broad Application Experience in Every Industry

WHATEVER YOUR CONTROL NEED — starting, smooth acceleration, speed control, stopping, reversing, dynamic braking — there is an Allis-Chalmers starter to do the job. All are easy to install and have construction features that assure long life, dependable operation, simplified inspection.

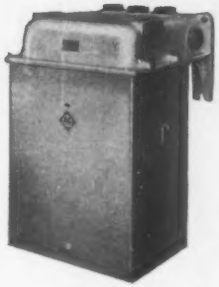
Low-Voltage Starters, Sizes 0-3 for example, have silver-to-silver double break contacts that never require dressing. A screwdriver is the only tool you need for inspection of magnet coils, heaters, contacts — all replaceable parts.

Sizes 4-7 have time-proven clapper-type contacts with rolling-wiping action to keep current carrying areas clean, free of pitting and arcing. Current is interrupted quickly and arcing minimized by chutes of new design. All electrical and mechanical parts are easily accessible.

High-Voltage Starters give you everything needed for complete motor control and protection in a single enclosure. Contactors, meters, overload relays, auxiliary switches — all needed parts are selected to meet the requirements of your application. Enclosures are compartmented to isolate high-voltage devices. If you need the short circuit protection of current limiting fuses, specify Type H high-voltage starters.

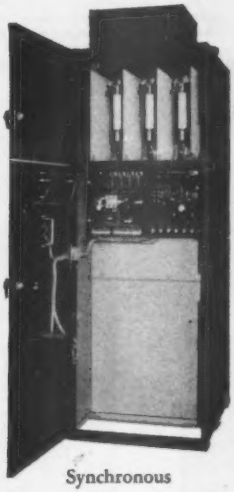
Remember, A-C application engineers have wide experience serving all industry. Their experience, plus this broad line of starters, is your assurance of the right starter for your job. Call your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

MOTOR STARTERS



Squirrel-Cage

THE TYPE 371 Wall-Mounted Starter for 2300-volt motors is completely sealed . . . protects the completely oil-immersed mechanism from weather, corrosion and dust. Wall mounting saves space.



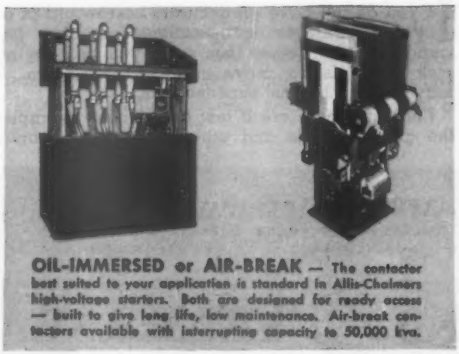
Synchronous

ALLIS-CHALMERS Synchronous Motor Starters apply field excitation automatically when proper speed is reached . . . even select the exact half cycle for smoothest field application.

Wound-Rotor

WOUND-ROTOR Motor Control for either starting or speed control duty, is built with the number of accelerating points your application requires. High-Voltage Starters are built for motors to 2500 hp.

Every Motor Need!



OIL-IMMERSED or AIR-BREAK — The contactor best suited to your application is standard in Allis-Chalmers high-voltage starters. Both are designed for ready access — built to give long life, low maintenance. Air-break contactors available with interrupting capacity to 50,000 kva.

Allis-Chalmers, Milwaukee 1, Wisconsin

Send for These

Send me the bulletins indicated below:

- ☐ High-Voltage Starters - - - - - - 1486410
- ☐ Type 371 Wall-Mounted Starter - - - 1487274
- ☐ Type 256 Air Contactor - - - - - - 1487303
- ☐ Low-Voltage Across-the-Line Starters - - 1487132
- ☐ Low-Voltage Reduced-Voltage Starter - - 1487215
- ☐ Control Devices - - - - - - - - 2587095

Name.....

Title..... Company.....

Address.....

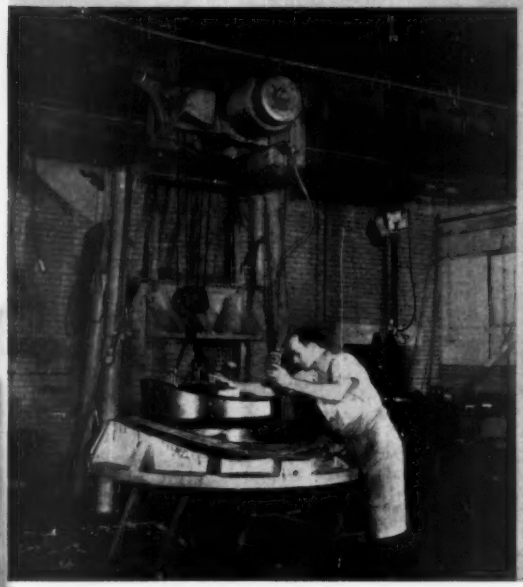
City..... State.....

A-3529

ALLIS-CHALMERS

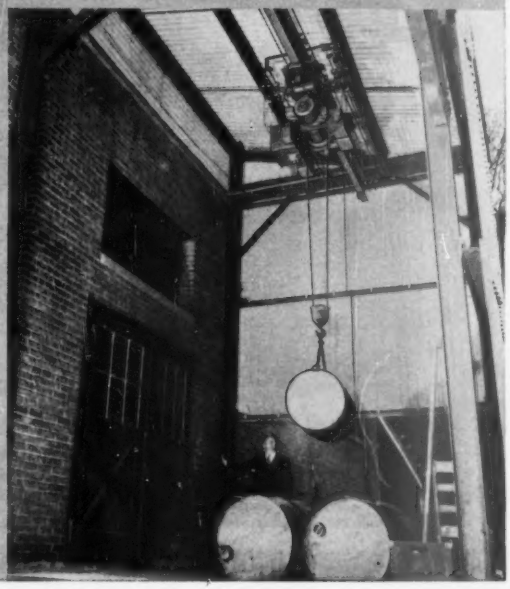
Cuts Die-Handling Time in ½

A large aircraft builder wrote: "Time and handling in this operation have been cut approximately in half by use of the Tramrail. In addition, operators report much greater safety and less danger of personal injury in handling heavy parts."



Automatic System Eliminates Three 10-ton Trucks

The need of three 10-ton trucks to haul materials between buildings was eliminated by a Cleveland Tramrail automatic dispatch system which does the job quickly without attendants accompanying. In addition, many man-hours of working time are saved daily and the load on an elevator is greatly reduced.



OVER 35,000 CLEVELAND TRAMRAIL *NOW SERVE* INDUSTRIAL

NOTE THIS: Regardless of size or type, MOST CLEVELAND TRAMRAIL INSTALLATIONS PAY FOR THEMSELVES WITHIN ONE YEAR—and they keep on paying handsome dividends year after year thereafter.

If you do not have an accurate cost record of all of your manufacturing operations, you may be astounded at the tremendous price you are paying to pick materials up, move and set them down. This may be your biggest expense item.

Illustrated here are a few actual case examples of the great savings and other important advantages

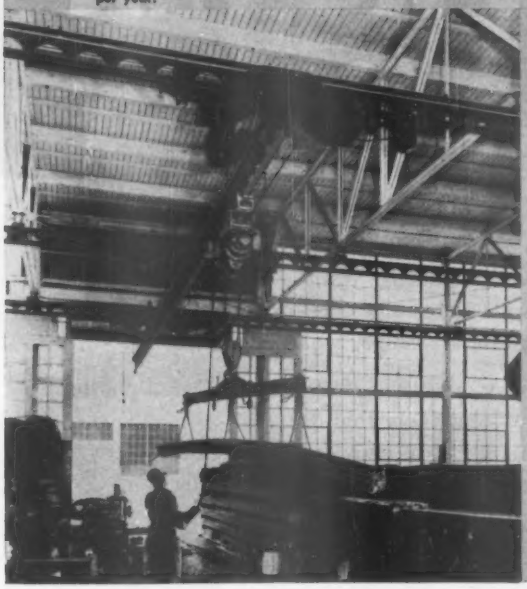
GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3264 EAST 284TH ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

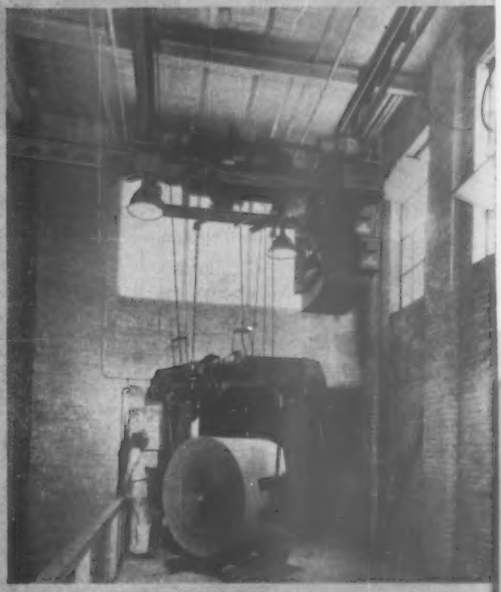
Saves $5,000 Yearly on Steel Cost

A West Coast manufacturer installed a completely motorized 5-ton Cleveland Tramrail transfer bridge that interlocks with an outside track over a railroad siding. Because this enables handling 5-ton bundles, a $2.00 per ton bundling charge is saved on steel purchased. Handling time is also saved. Since 200 tons are used monthly the total savings amount to $5,000 per year.



7,500 lbs. Paper Spoilage Saved Daily

Among other important cost-reducing advantages, this cab-operated crane with motorized roll grab in a large paper warehouse, cuts damage losses by 1% of total tonnage handled. Approximately 150 rolls weighing 750,000 lbs. are handled daily.



INSTALLATIONS AMERICA

Cleveland Tramrail has brought about in nearly every industry. Most likely you, too, have materials handling jobs in your plant from which big savings can be made. Why not have our engineers make a study and present recommendations, without obligation, of course?

Foundry Jumps from 3 Heats to 8 Daily

With no increase in man power, the installation of an inexpensive Cleveland Tramrail handpropelled system in a small brass foundry, made a terrific difference in their operations. It made possible 8 heats a day instead of 3, formerly usual. Despite more than double output, the men are less fatigued now at the end of a day.

Increases Roll Storage Capacity 50%

The 400-lb. cloth rolls in foreground could only be piled two high until the Tramrail bridge was installed. Now one man can pile them three high easily. He can also deliver them to other parts of the building on the bridge and overhead track, directly without rehandling, thus cutting cost in this way, too.

Ammunition racks for Army
Hundreds of special parts for mobile units
Dynamometer checking cabinets for Navy
Instrument panels for Army
Spare parts boxes for gyroscopes
Foot lockers for Army
Light cases for Signal Corps
EXAMPLES OF LYON SPECIAL PRODUCTION DURING WORLD WAR II
Telephone stowage lockers for Navy
Bomb fin cases for Ordnance
Communication unit for Signal Corps
Ammunition racks for tanks
Electronic repair kit for Navy
Ammunition box for Navy
Bomb sight shipping cases for Air Corps

A PROVEN *for Sheet*

● Lyon handled 3800 sheet metal contracts during World War II . . . a wide range of special parts and assemblies for aircraft, ships, tanks, ordnance.

Today, with two strategically located plants providing more than 600,000 square feet of manufacturing space, we are geared to do an even better job.

For sheet metal defense production and special contract work— Lyon is a *proven* source of supply.

2 STRATEGIC PLANT LOCATIONS { **AURORA, ILL.** / **YORK, PA.**

LYON

METAL PRODUCTS, INC.

General Offices:
112 Monroe Ave., Aurora, Ill.

LYON PRODUCTS STILL SERVING INDUSTRY

- Shelving
- Lockers
- Stools
- Bin Units
- Kitchen Cabinets
- Cabinet Benches
- Storage Cabinets
- Drawing Tables
- Conveyors
- Bar Racks
- Tool Boxes
- Parts Cases
- Economy Locker Racks
- New Freedom Kitchens
- Toolroom Equipment
- Wood Working Benches

SOURCE of SUPPLY
Metal Contracts

MAIL COUPON FOR YOUR COPY

of this very comprehensive 20-page brochure. It gives the complete story of Lyon's facilities. Or contact your nearest LYON Field Representative.

• BUSINESS • INSTITUTIONS • HOMES

• Display Equipment	• Filing Cabinets	• Service Carts	• Tool Stands
• Flat Drawer Files	• Folding Chairs	• Sorting Files	• Shop Boxes
• Revolving Bins	• Work Benches	• Drawer Units	• Tool Trays
• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks

LYON METAL PRODUCTS, INC.
112 Monroe Ave., Aurora, Illinois

Please send me a copy of "Craftsmen in Sheet Metal."

NAME_____

TITLE_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

WHEN THINKING OF ELECTRICAL PROTECTION KEEP IN

with rare exceptions on Commerci

Fusetron dual-element Fuses—

1. * Protect against short-circuits.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

COUNT 'EM

DON'T RISK LOSSES

One **needless** shutdown . . .
One **lost** motor . . .
One **destroyed** switch or panel
One **burned out** solenoid . . .

May cost you far more than replacing every ordinary fuse with a Fusetron dual-element Fuse.

Mail the coupon now for complete information about the All-Purpose Protection of FUSETRON Dual-Element FUSES.

(FUSETRON is a trade mark of Bussmann Mfg. Co., Division McGraw Electric Co.)

* Fusetron Fuses have high interrupting capacity shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

Bussmann Mfg. Co., University at Jefferson
St. Louis 7, Mo. (Division McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element Fuses.

*Name*_____

*Title*_____

*Company*_____

*Address*_____

*City & Zone*_____ *State*_____ 152

How **TENNANT** *machines help you...*

save the most manhours on *ALL floor-cleaning jobs*

For removing HEAVY GRIME in one fast operation

TENNANT Industrial Floor Machines

Faster than a crew of men, one of these powerful machines pulverizes tough, grease-caked grime . . . *picks it up in one operation.* Saves hours of costly hand work. Leaves floor ready for immediate traffic.

REQUIRES ONLY 1 MAN. As your operator guides machine over floor it cleans a path 16" wide . . . removes up to 20 lbs. or more of dirt per minute. Has ample power for tough jobs.

CUTS DIRT LOOSE, PICKS IT UP. Revolving cylinder instantly shears away hard-packed grease, chips, paint . . . hurls it into hopper; vacuum controls dust. Does entire job DRY; no chemicals or water; no need to rope off areas.

SMOOTHS AND LEVELS SURFACE. Planing action of cylindrical wire brush or Revo-tool levels humps . . . leaves ideal surface for trucking; will not dig or gouge. *Available in 3 standard sizes: 16", 12" and 8". Specify gas or electric model.*

SEVERAL MEN WITH SCRAPERS, working at top speed, couldn't do the job of this one man—cleaning shop floors with a Tennant "K" Floor Machine. Removes heaviest grime in 1 fast operation, cleaning path 16" wide. Instantly provides clean, dry, level surface. Gas or electric; complete accessories for ALL jobs.

MODEL "J" cleans 12" path; can be used in congested areas.

For fast vacuumized POWER SWEEPING

TENNANT Power Sweepers

Used by 15 of the top 20 firms* in the U. S. (and by hundreds of others), Tennant Power Sweepers have a well-earned record for long, dependable service . . . plus outstanding *cost-saving performance.* We know of no maintenance equipment that pays for itself so promptly.

SWEEPS AN ACRE AN HOUR. With a Tennant Model 36 Sweeper one man sweeps up to 54,000 sq. ft. per hour (open areas) . . . at speeds to 6 M.P.H. Cleans path 36" wide (48" wide if side brush is also used).

DOES EXTRA-CLEAN JOB. Brush revolves inside *vacuum-equipped* compartment . . . whisks up litter and debris; even cleans many cracks and crevices; helps cut costs.

EASY TO USE, TURNS "ON A DIME". With its rear-wheel steering, reversing clutch, etc., the Model 36 is ideal for busy plants. Easier to drive than a car! *Gas or battery models; also in 24" unit* (see photo).

*Top 20 non-financial firms ("Business Week", 5-12-51)

Write today! Get illustrated bulletins, case histories, cost data. Specify size of machine, savings desired, type of soilage, etc.

IT PAYS FOR ITSELF FAST! The tremendous manhour-savings made by Tennant Model 36 Power Sweepers put it in a class by itself. One big U.S. firm has 69 of them . . . and one unit paid for itself in 22 days. (Case histories on request.)

Machine has capacity of 54,000 sq. ft. per hour, cleans a 36" path, has combined brush-and-vacuum system for extra clean work. Has 7.3 h.p. engine, drives like a car. Built for heavy-duty work. Now available in GASOLINE and BATTERY TYPE models.

NEW Battery-type Model 36 sweeping warehouse floors.

MODEL "24" sweeps narrow aisles; has big-sweeper capacity.

G. H. TENNANT CO.
2554 N. Second Street
Minneapolis 11, Minnesota

TENNANT
Established 1870
OFFICES IN PRINCIPAL CITIES

INDUSTRIAL FLOOR MACHINES
CREATORS OF THE TENNANT SYSTEM OF FLOOR MAINTENANCE—MANUFACTURERS OF EQUIPMENT AND MATERIALS FOR MAINTENANCE OF FLOORS, DECKS, ROOFS, HIGHWAYS

Stopping Rust with RUST-OLEUM 769 D.P. Red Primer

RUST-OLEUM

Look for this label. Be sure it's genuine RUST-OLEUM!

All Colors, Aluminum and White—Beautifies As It Protects!

This practical coating may be applied directly over surfaces already rusted without removing all the rust! Simply wirebrush and use sharp scrapers to remove rust scale and loose particles . . . sandblasting and chemical pre-cleaning are not usually required. Easy to apply by brush, dip, or spray . . . dries to a firm, pliable coating. Cut your maintenance costs, save metal — with RUST-OLEUM! Prompt delivery from Industrial Distributor stocks in principal cities.

RUST-OLEUM CORPORATION
2451 Oakton Street, Evanston, Illinois

STOPS RUST!

FREE SURVEY: A RUST-OLEUM specialist will gladly survey your rust problems. He'll make specific tests and recommendations. No cost or obligation. See Sweets for complete catalog and nearest RUST-OLEUM distributor, or write for literature on your company letterhead.

CLIP THIS TO YOUR LETTERHEAD
MAIL TO: RUST-OLEUM CORPORATION
2451 Oakton Street • Evanston, Illinois

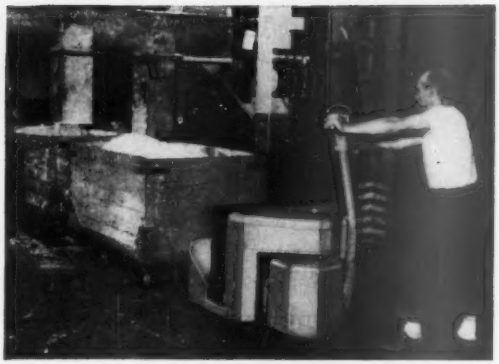
- ☐ Have a Qualified Representative Call
- ☐ Full Details on Free Survey
- ☐ Complete Literature
- ☐ Nearest RUST-OLEUM Source

CUT MATERIALS-HANDLING COSTS WITH ELECTRIC TRUCKS...

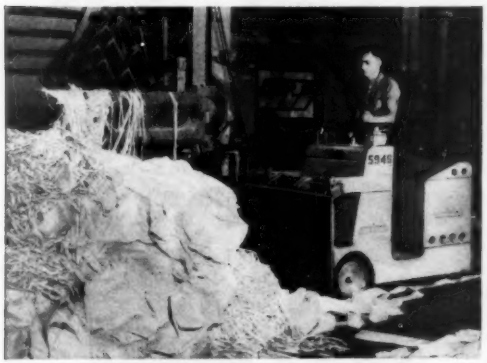
PAPER COMPANY SAVES $140,000 IN FIRST YEAR WITH $52,000 INVESTMENT!

Electric trucks equipped with G-E motors and control are used by the S. D. Warren Co., Maine paper manufacturers, as an integral part of their production operations. The company's initial investment of $52,000 in Lewis Shepard units has paid real dividends —in their first year of operation, these trucks have saved $140,000 in materials handling costs.

To keep materials flowing between processing points, the electric trucks operate 24 hours a day, 7 days a week. They handle over 400 tons of material and travel 8 to 40 miles daily.



Driver-load truck pulls carts under chutes to be loaded with semi-dried processed pulp, which is then transferred to the "beater" tanks for further processing.

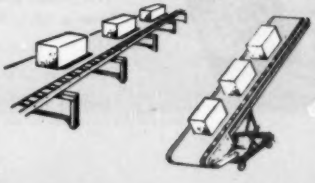


Feeding waste paper to shredder for reprocessing has been increased from 170 tons per day by manual labor to 225 tons per day through the use of a modified driver-ride truck.

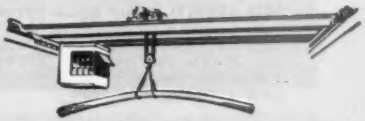
Pulp is dumped from carts into beater with driver-ride truck. Suitable trucks are also used to carry other raw materials required for paper-making from warehouse to production usage points.

Everything electrical for MATERIALS HANDLING

CONVEYOR DRIVES



CRANE DRIVES



POWERED by G.E.

Longer truck life, less maintenance and downtime with new G-E drives for electric trucks

- Magnetic control providing timed acceleration and electric braking minimizes abuse to electrical and mechanical parts of truck.
- More work per battery charge. Less power loss in resistor at reduced speed operation.
- Easy accessibility of parts simplifies maintenance.

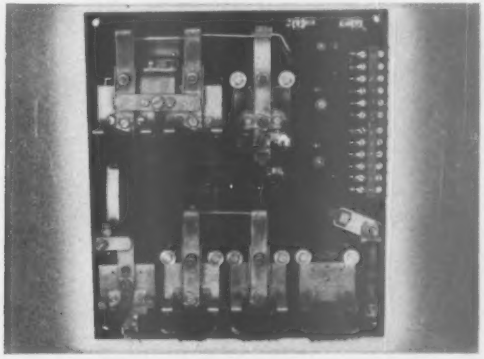
Add many other features to these and you'll see why the new G-E electric-truck drives give your trucks better availability, economy, and efficiency.

These new drives are the culmination of G.E.'s experience in manufacturing electric-truck drives, and long association with truck builders. They also represent years of electric-truck operating experience both in G-E plants and by other users. Ask your G-E representative for full details, including new Bulletin GEA-5630, or write to *General Electric Company, Section 669-3, Schenectady 5, N. Y.*

FREE! Write for a copy of this manual today!

As a service to the materials-handling industry, General Electric offers a free manual, "Materials Handling." Part of G.E.'s MORE POWER TO AMERICA program, it contains a comprehensive survey of materials-handling equipment, methods, and practices. Write on your letterhead for Bulletin GEA-4962. To go with the manual, G.E. also has produced the film "Materials Handling—In Receiving, Warehousing, and Shipping." Ask your equipment supplier or G-E representative to arrange a free showing for you.

Type BT Electric-truck motors—specially designed for round-the-clock, start-stop service. Large commutators, Class B insulation, easily accessible brushes are a few of their many outstanding features.



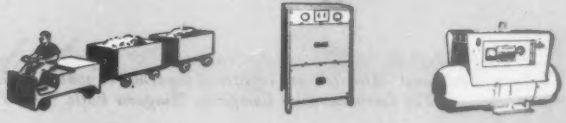
Magnetic Control—smooth operation, immediate response, fast acceleration, and minimum power consumption were primary considerations in designing the new control. Control-panel parts are easily accessible.

GENERAL ELECTRIC

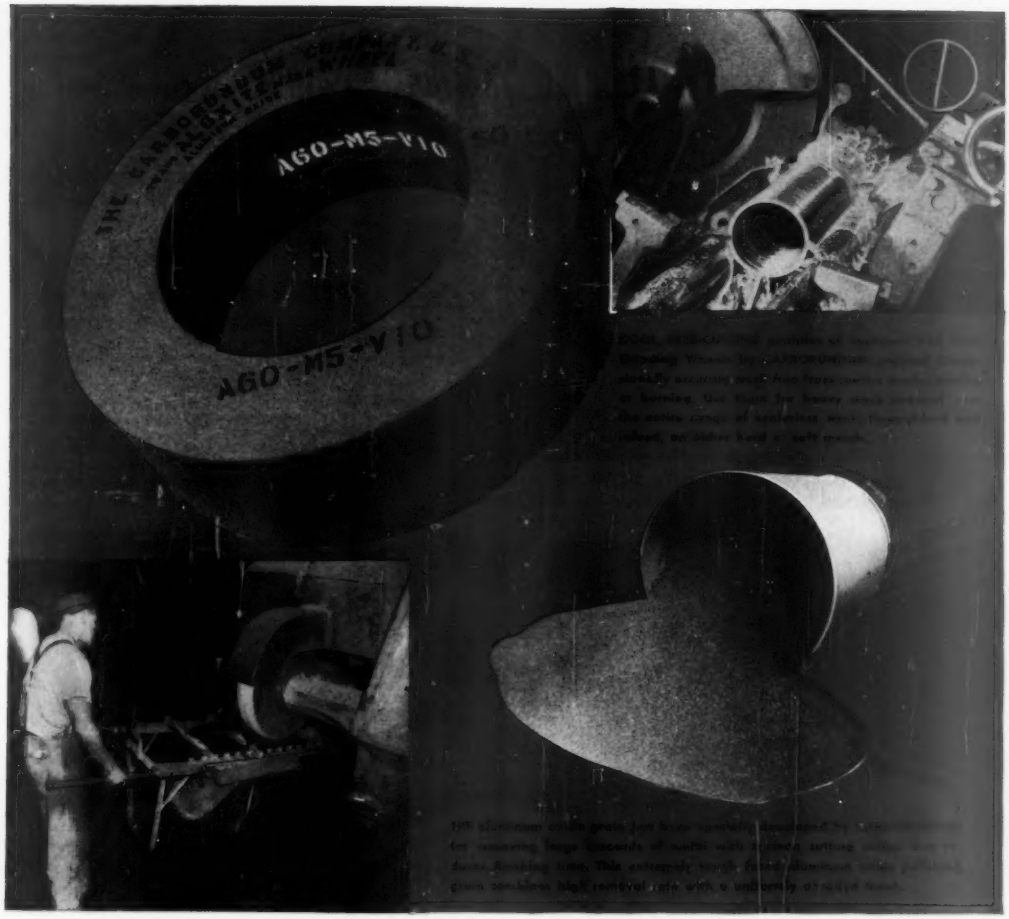
669-3

HOIST DRIVES

INDUSTRIAL TRUCK DRIVES AND BATTERY CHARGERS



No Stone Unturned When

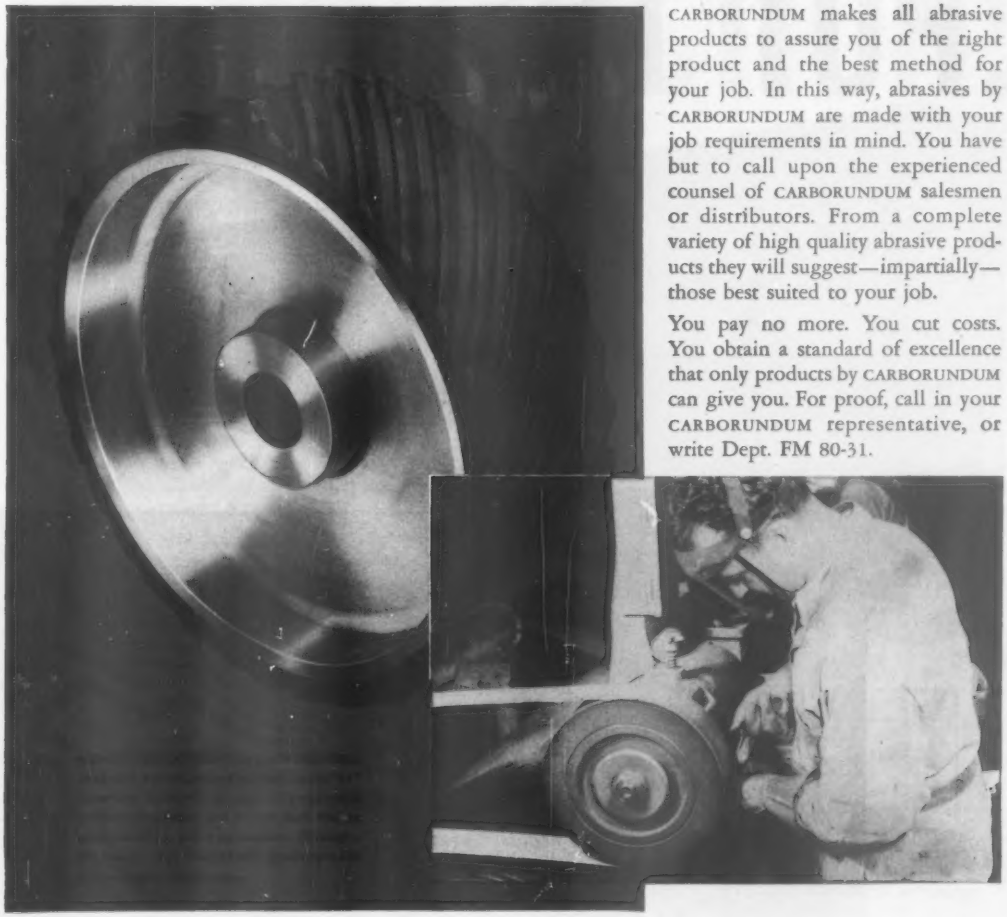


Only CARBO

TRADE

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

You Buy CARBORUNDUM
Brand Products



CARBORUNDUM makes all abrasive products to assure you of the right product and the best method for your job. In this way, abrasives by CARBORUNDUM are made with your job requirements in mind. You have but to call upon the experienced counsel of CARBORUNDUM salesmen or distributors. From a complete variety of high quality abrasive products they will suggest—impartially—those best suited to your job.

You pay no more. You cut costs. You obtain a standard of excellence that only products by CARBORUNDUM can give you. For proof, call in your CARBORUNDUM representative, or write Dept. FM 80-31.

RUNDUM
MARK

makes ALL Abrasive Products... to give you the proper ONE

80-31

ALLIS-CHALMERS
PUT THE "Heat"

Official Department of Defense Photo.

UNIT SUBSTATIONS

ON PRODUCTION!

YOU CAN INCREASE the production of your plant without adding production equipment or hiring more help . . . just eliminate undervoltage. Motors, lights, heating units—all electrical equipment gives top performance only when operated at full voltage.

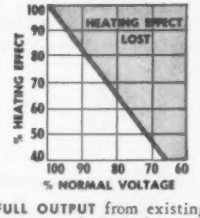
Paint baking or drying operations take longer when voltage drops. For example, a 10% drop reduces heating effect of infra-red lamps 19% . . . slows production. One paint drying operation required 63% more time when voltage dropped 10%.

A major cause of undervoltage is long, heavily loaded 480 volt feeders. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Performance of all electrical equipment will improve . . . and personnel efficiency will increase because of better illumination from existing lighting fixtures.

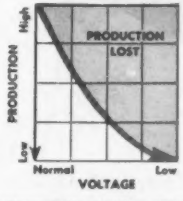
You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3372

LCS Unit Substations

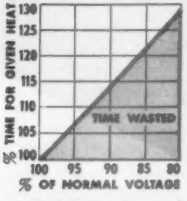
HOW UNDERVOLTAGE WASTES MANHOURS . . . CUTS PRODUCTION



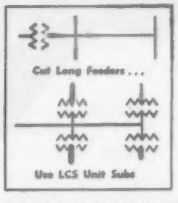
FULL OUTPUT from existing equipment demands full voltage. Heat output of infra-red lamps (used for baking paint on metal, drying coils of electrical apparatus and similar applications) drops with undervoltage. Output of resistance furnaces also drops off as the square of undervoltage.



PRODUCTION LOSSES RESULT from undervoltage. In one case a 10% drop in voltage cut the output of an infra-red drying oven from 1500 pounds per hour to 1275. Undervoltage means less work done each day . . . greater overhead for the work done, more manhours to be figured into every job.



TIME IS WASTED when undervoltage is distributed to infra-red bulbs and other heating devices. It takes longer to deliver the same amount of heat . . . longer to do a given job. In one plant, drying time for black painted sheet steel increased from 11 to 18 minutes by a 10% drop in voltage.

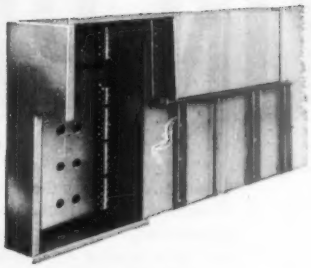


A MAJOR CAUSE OF UNDERVOLTAGE is voltage drop in secondary feeders. Long low voltage lines may prove inadequate as production schedules are stepped-up and new machines added. Install substations at load centers to cut feeder length, reduce voltage drop and increase production.

ALLIS-CHALMERS

ELECTRIC FEEDRAIL®

"Nerves" for a 30-ft. giant



Partial view of 79 pole, multiple conductor Feedrail trolley busway system that distributes current for power and control of this 30-ft. giant mill. Except for critical hand lever adjustments, all control is through buttons and selector switches located in remote dual console stations.

This huge thirty foot vertical boring and turning mill was built by the Niles Tool Works Div., Baldwin-Lima-Hamilton for Allis-Chalmers Mfg. Co.

Giant thirty foot boring mills are not built every day. When they are, precision control is essential. A 79 pole multiple conductor Feedrail provides the "nerve system" for finger-tip control and dependable, unfailing power supply for this massive machine.

Every day Feedrail is solving power and control problems. Moving trolley outlets in an enclosed track roll with electric tools which must follow work. Power machines move in and out of work centers quickly, and produce more work in less time. Feedrail flexibility is engineered into standardized units that assemble to give a "tailored to fit" power supply system. Write for literature.

Sold by leading electrical distributors.

46-C

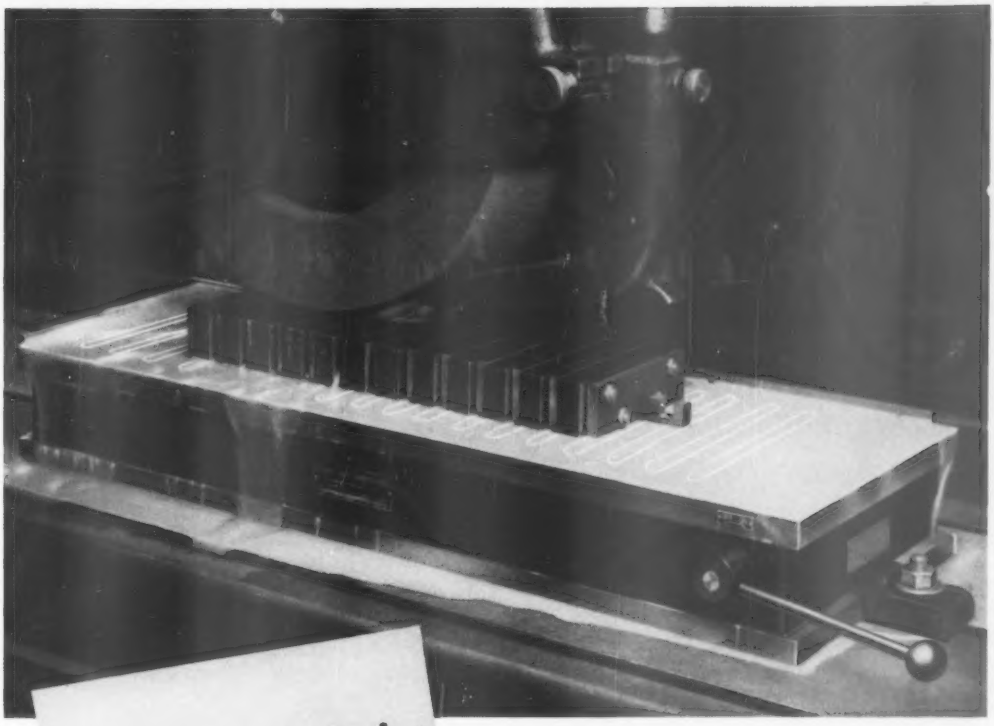
ELECTRIC FEEDRAIL®

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET · NEW YORK 7, N. Y.



Economical way to save machinists' time

PERMANENT MAGNET CHUCKS

by Brown & Sharpe make the most of a skilled machinist's time — let him do, speedily, many tasks that require extra work by other means.

These economical time-savers are completely portable, have no wires to connect, cost nothing to operate, hold as long as desired without heating, last indefinitely. Permanent Magnet Chucks speed setting up . . . eliminate the need for clamps, vises, jigs or fixtures on many jobs. A quick shift of a lever engages or disengages magnetic holding power.

Complete line includes Rectangular Models for grinding, inspecting, light machining; and Rotary Models for light lathe work, cylindrical and face grinding. Rectangular Models available in 8 sizes from $2\frac{7}{16}$" x $5\frac{1}{4}$" to $12\frac{1}{8}$" x 36"; Rotary Models in 5", 7", and 9" diameters. For sale only in the United States and its territories. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

WE URGE BUYING THROUGH THE DISTRIBUTOR

Brown & Sharpe B·S

BUY NOW

MANUAL MOTOR CONTROLS

Remove power installation bottlenecks . . .
Act now for delivery of Westinghouse manual starters

Here's how to lick a double-edged threat to tight production schedules and critical maintenance problems.

First, get your manual motor controls — now! Westinghouse offers you prompt handling of orders, speedy action on delivery of across-the-line small motor controls for usual applications and for special operating conditions. In addition, Westinghouse engineers can help you apply available motor and control equipment to the best possible advantage.

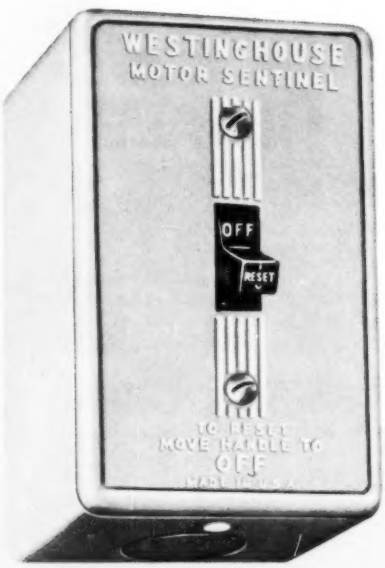
Second, get the control that is built to beat the heat of today's pace—the control of proved reliability that only top design engineering and superior productive facility can give you.

Buy from the greatest selection of motor control in industry today. Call or wire your Westinghouse Distributor.

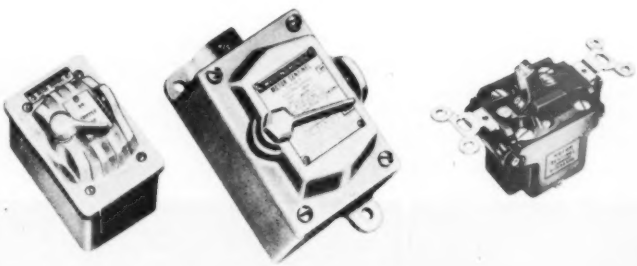
Across-the-line manual motor sentinel* for small motors

1. For a-c or d-c single-phase small motors, 1 hp and below, single or double-pole types.
2. Positive, time-delay bimetallic action . . . assures reliable motor overload protection.
3. Safe . . . completely enclosed, no live operating parts exposed; trip-free switch can't be held closed against overload; foolproof calibration.
4. Trouble-free . . . over-center toggle mechanism; quick-make, quick-break.
5. Durable, lightweight enclosure . . . die cast of aluminum; Bonderized for long life; dust resistant.
6. Meets all requirements of National Electric Code.
7. Heater front removable—not necessary to disassemble or remove from enclosure.

*T. M.



Manual Motor Sentinel with Standard Surface Enclosure.



ENCLOSURES FOR EVERY REQUIREMENT

Cast-iron dust-tight, water-tight enclosure; compact, smallest in industry; NEMA III, IV and V.

Cast-iron explosion-proof enclosure; NEMA VII Class I, Group D; NEMA IX Class II, Groups E, F and G.

Switch Unit Alone—Operating mechanism completely enclosed in sturdy bakelite housing; fits any standard 2½" deep wall box for flush applications.

NEMA I-A semi-dust-tight manual motor starter
Special gasketing exclusive in the industry

The Westinghouse Semi-Dust-Tight Manual Starter is ideal for dusty or oil-laden atmospheres where more expensive explosion-proof types of starters are not required by Code. Neoprene rubber gasket insures a tight fitting cover. Another new feature is the attractive rotary operating handle. All other proved features are identical with the outstanding Westinghouse Motor Watchman®, Type DNW, Class 10-100. Applications include woodworking machinery, grain mills and machine tools, and locations where oil, dust and cutting coolants are used.

The enclosure is Bonderized for positive rust-resistance; adds years to starter life.

Available now in Class 10-100 VOA, Size O, and Class 10-100 VI, Size 1. J-30081

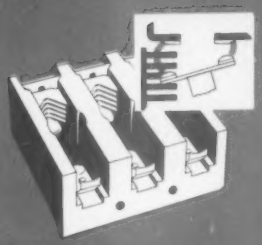
NEMA I-A Manual Motor Starter

FM

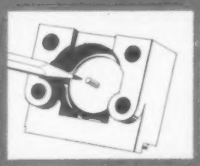
The Only Starter Meeting All Requirements of the Associated Factory Mutual Fire Insurance Companies.

SUPERIOR DESIGN

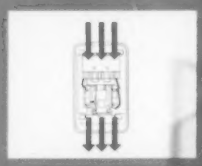
Continuous Neoprene Gasket Pressure Sealed On; Keeps Dust Out; Lift-Off Cover Provides Quick Inspection and Servicing of Starter.



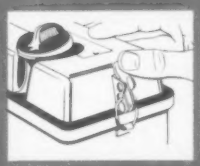
1. "De-ion"® Arc Quenchers Reduce Arcing Time, Extinguish Dangerous Arcs in Half-Cycle.



2. Positive Bimetallic Snap-Action Disc Overload Protection.

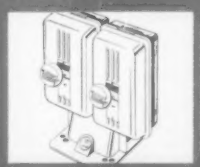


3. Straight Through Wiring Speeds Installation, Maintenance.

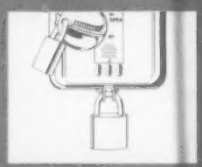


4. Pressure-Type Cover Clamp—Tight Seal Is Maintained.

5. Rotary Handle Prevents Accidental Operation; Dust-Proof.



6. Single or Double-Mounting Pedestals for Floor Applications.



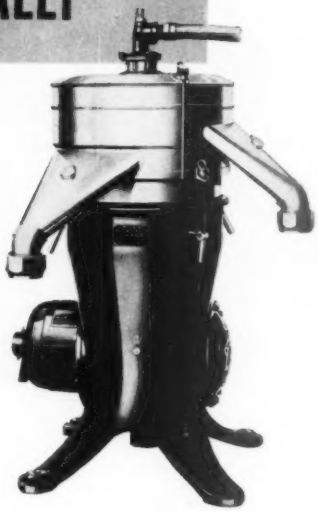
7. Handle and Cover Locks to Eliminate Tampering.

YOU CAN BE SURE... IF IT'S

Westinghouse

CONTROL

TO SAVE MONEY ON OIL:
---MAKE IT DO MORE WORK
BY PURIFYING IT CENTRIFUGALLY

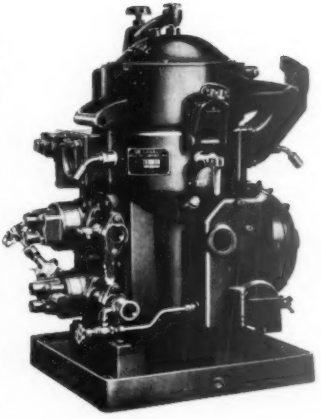


De Laval Oil Purifiers and Coolant Clarifiers keep all kinds of factory oil free from the impurities normally collected in service. They remove dirt, metallic particles and water from factory oils of all kinds, and insure that the oil is kept clean continuously.

De Laval purification enables the oil to be used indefinitely with perfect safety. Full efficiency can be maintained at all times—hence, less oil can do more work.

Machine tools are better protected against wear; cutting or grinding tools last longer, and work can often be performed faster when oil or coolant is properly purified. All of these advantages add up to one whole—more production.

De Laval machines cover a wide range of applications in all kinds of plants. Write for Bulletin MM-1; it contains a list of many kinds of factory oils that can profitably be purified.



THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval

PURIFIERS and CLARIFIERS FOR FACTORY OILS

Tired of Guessing about PROTECTIVE COATINGS?

As a matter of fact, you can't *afford* to guess about protection these days. With equipment so expensive and hard to replace, it's imperative that you use the coatings *specifically* compounded to protect against the type of corrosion encountered at *your* plant . . . and to do it efficiently and economically.

And your *best* chance of accomplishing that is to call on Pitt Chem—Industry's Most Comprehensive Family of Protective Coatings. We'll be able to help you select the *right* coating to solve your specific corrosion problems. The facilities of our coatings laboratory and technical service department are ready to assist you to the fullest.

Write for FREE Corrosion Control Booklet

Contains specific information on Pitt Chem Protective Coatings, including recommendations for use.

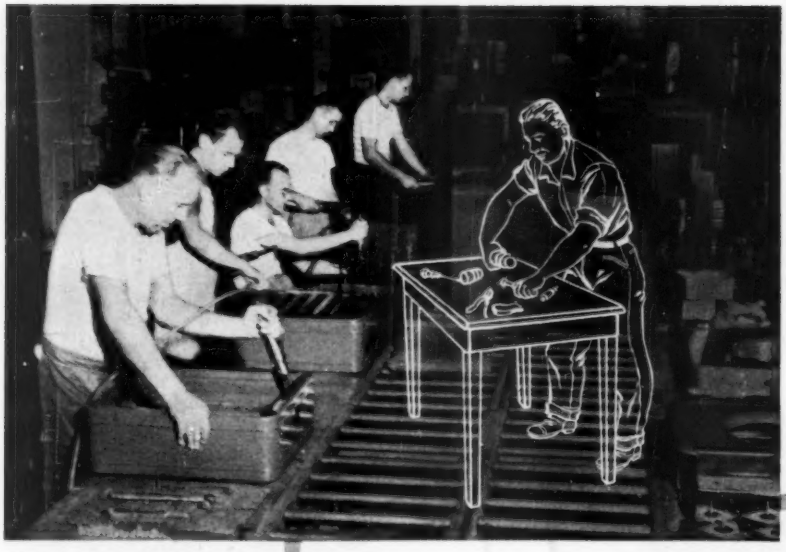
PITT CHEM is Industry's Most Comprehensive Family of Protective Coatings

- ★ COAL TAR
- ★ VINYL
- ★ ALKYD
- ★ PHENOLIC
- ★ CHLORINATED RUBBER
- ★ EPOXY
- ★ OTHER SPECIALTY COATINGS

WAD 3952

PITTSBURGH COKE & CHEMICAL CO.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON



Photograph shows Keller Ratchet Wrenches being used as nut runners in assembling unit heaters.

Let the boys in the tool room tell you about Keller

KELLER
Pneumatic Tools

Those who are responsible for tool maintenance know which tools come back most often for service. They know how easy or difficult each brand is to take down and reassemble.

They know how many repair parts must be kept in stock. They know which tools can be adapted from one job to another, and how long it takes to make the change-over.

Ask these men about Keller Air Tools. You will find that wherever Keller Tools are used, service requirements are easy and relatively inexpensive . . . and that only a small inventory of parts is needed because of their interchangeability.

Where lightweight tools can speed repetitive operations—as in production and assembly jobs—you hear Keller spoken of with increasing esteem.

KELLER TOOL COMPANY, GRAND HAVEN, MICH.

ELIMINATE COSTLY DOWN TIME

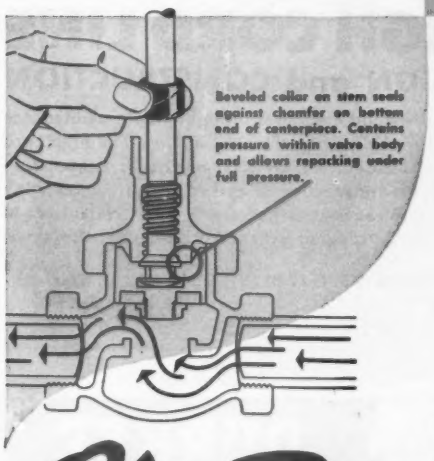
Repack
UNDER FULL PRESSURE

With O-B industrial process or maintenance valves, you don't have to shut down a line just to replace worn packing. Simply open the valve all the way and remove the packing nut. In the full open position, the stem effectively seals off line pressure, allowing the packing to be replaced safely and quickly without even a moment's interruption of line service.

In these days of capacity production, downtime is particularly costly. Why not eliminate this unnecessary expense by specifying O-B the next time you need standard pressure valves for steam, air, water, gas, or other industrial service?

You will find a complete line available from your local Ohio Brass distributor. Call him today for any of your bronze valve needs.

OHIO BRASS COMPANY · MANSFIELD, OHIO


Beveled collar on stem seals against chamfer on bottom end of centerpiece. Contains pressure within valve body and allows repacking under full pressure.

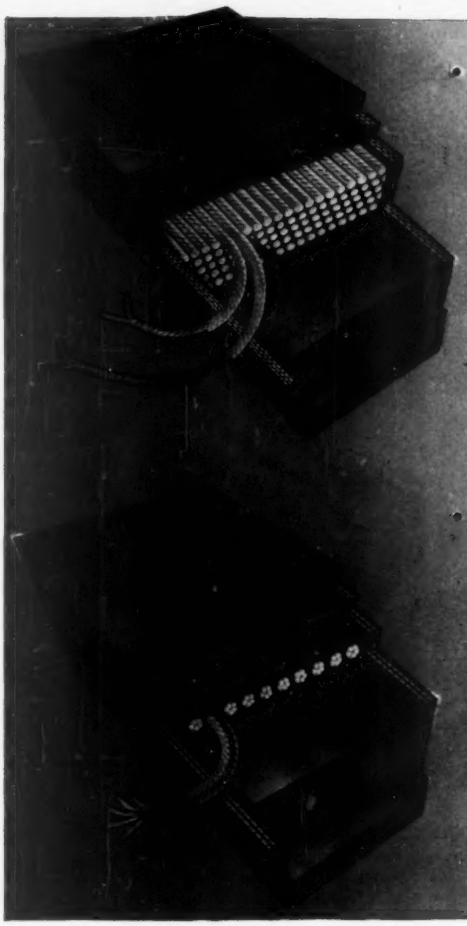
O-B No. 11 Line Valve Featuring Outside Screwover Bonnet. Globes and Angles Available ¼ to 3 inches in size. 150 pounds W.S.P. 300 pounds W.O.G.

4169-V

Ohio Brass VALVES

BRONZE GLOBES ANGLES GATES AND CHECKS

THESE FEATURES INCREASE V-BELT LIFE...CUT DOWN-TIME



....in Multiple Belts

DURKEE-ATWOOD

ISO-DYNAMIC MATCHING

The power-transmitting efficiency and the durability of mutiple v-belt drives varies with the precision achieved in matching. Static balancing is not adequate. To assure precise matching, Durkee-Atwood balances multiple v-belt drives *Iso-Dynamically,* matching belts while running under full load. Equal in length, equal in tension, Durkee-Atwood matched v-belts give you a more efficient, more durable drive.

....in General Duty Belts

DURKEE-ATWOOD

HIGH CORD LINE DESIGN and CONSTRUCTION

Durkee-Atwood engineers brought v-belt maintenance costs *down* by moving the cord line *up.* The high cord line places the entire body of the belt under compression forcing the entire sidewall against the sheave reducing slippage. Wear is absorbed evenly by a greater area of the sidewall, reducing wear and prolonging belt service.

DURKEE-ATWOOD COMPANY, Minneapolis 13, Minn.

Dept. F-1

WANT FASTER SERVICE?—Get dependable, hurry-up service every time from Durkee-Atwood Distributors . . . the right-sized belt *when you want it!*

WANT A FULL-LINE SELECTION?—Get the size you want from your local Durkee-Atwood Distributor. Durkee-Atwood makes a full line of multiple V-belts . . . A through E sections . . . up to 660 inches.

WANT DEPENDABLE TRANSMISSION?—Behind Durkee-Atwood is a 30 year record of quality products. Immediate attention to emergency orders is another feature of Durkee-Atwood service to its distributors *and their customers!*

DA PRODUCTS SINCE 1910

DURKEE ATWOOD

FORM 524

the drive that has everything

compactness

large load capacity

low original cost

low operating cost

delivery out of stock

modern design

high quality precision gearing

Foote Bros. Line-O-Power Enclosed Gear Drives offer industry compact, straight-line units with efficiencies of 96% or higher.

Duti-Rated high hardness precision gears are assembled into streamlined housings of rugged cast iron.

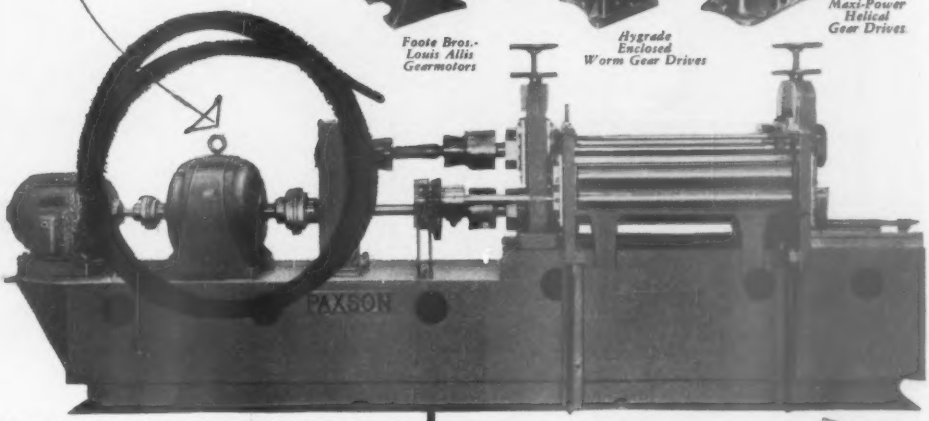
Economical in original cost because the latest, most accurate high production machine tools assure rapid production with exceptional accuracy for long wear life. Economical to operate because simplified construction, minimum number of moving parts, direct splash lubrication, quality workmanship all hold maintenance to a minimum.

Line-O-Power Drives are available for delivery from stock in double or triple reductions for capacities from 1/2 to 200 h.p., with ratios from 5 to 1 up to 238 to 1

Foote Bros.-Louis Allis Gearmotors

Hygrade Enclosed Worm Gear Drives

Maxi-Power Helical Gear Drives



Standard 36-inch slitter, manufactured by Paxson Machine Co., Salem, Ohio

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. O, 4545 South Western Blvd.
Chicago 9, Illinois

Foote Bros. Gear and Machine Corporation
Dept. I, 4545 South Western Boulevard
Chicago 9, Illinois
Please send me a copy of Bulletin LPB on Foote Bros. Line-O-Power Drives.

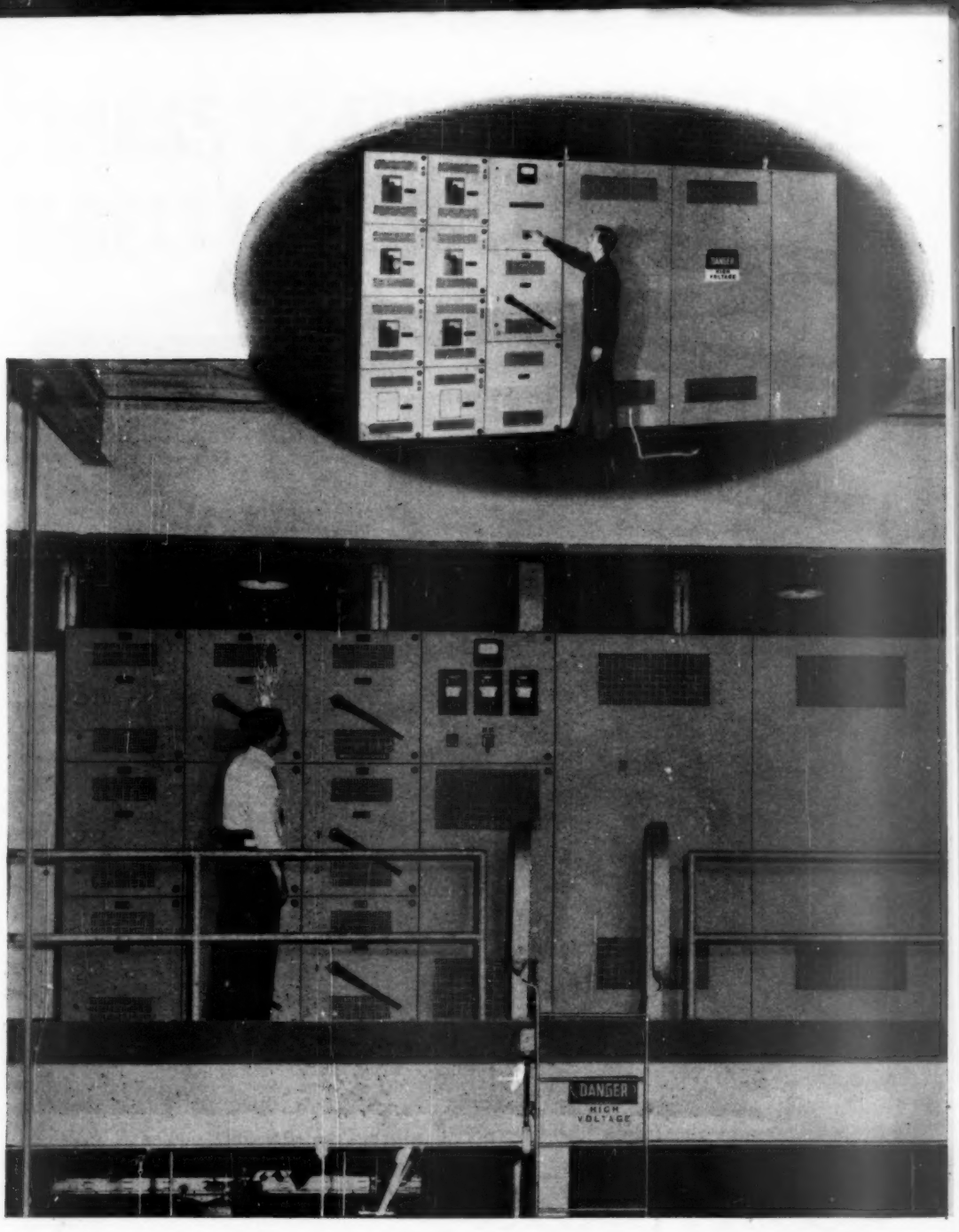
Name.....

Company.....

Position.....

Address.....

City.....Zone.....State.....


DANGER
HIGH
VOLTAGE

Westinghouse Power Centers

Trim Power Control Costs

for Chicago Pneumatic Tool Company

Six Westinghouse Power Centers, consisting of dry-type transformers and switchgear, are serving operations in Chicago Pneumatic Tool Company's new plant at Utica, N. Y. And their favorable effect on power control costs—summed up in the following statement—suggests a savings opportunity for you.

"By bringing high voltage to the power centers, heavy copper from the main substation was avoided . . . voltage regulation and voltage drops were well within acceptable limits. Compact design enabled us to place some of the units on a small mezzanine to provide more space for production on the main floor.

"Since all units are duplicates, we enjoy maximum interchangeability and a resultant savings in spare parts. For future convenience and economy, spare feeder compartments are equipped to take additional breakers as the load increases."

Dry-type power centers will enable this user to realize even further savings. The elimination of vaults, oil conditioning and testing, promises a saving in routine maintenance. Freedom from fire hazard warrants lower insurance rates. Maintenance of a good voltage condition assures more efficient performance of manufacturing equipment.

GET THE COMPLETE STORY

Westinghouse Power Centers are the key to efficient power distribution. They offer better service continuity, greater flexibility, better regulation . . . all the things that contribute to power control economy. Most important, they provide the simplest, lowest-cost means of attaining the power system that best meets your operating requirements.

Booklet B-4162 covers Westinghouse Power Centers in detail. Booklet B-4045 discusses various types of plant distribution systems wherein power centers offer maximum advantage. For your copies, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60763

YOU CAN BE SURE... IF IT'S Westinghouse

POWER CENTERS

"270 SKIL Drills made quick change to defense production possible!"

Says J. D. JOHNSTON, plant superintendent,
SWALLOW AIRPLANE COMPANY, INC., Wichita, Kansas

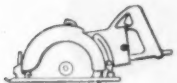
When tooling up for the assembly of military aircraft parts, the Swallow company added 50 Model 45 SKIL Drills to the 225 already in use. J. D. Johnston, plant superintendent says, "We credit our quick change-over from commercial production to defense production to the adaptability of SKIL Drills in all assembly problems.

"Since all of this defense contract must be done with precision and speed, we had to select a drill that would keep up with our assembly rate and precision requirements," says Mr. Johnston. "For instance, in this assembly job here on an aileron drum and shaft assembly the Model 45 SKIL Drill is being used with a reamer to correct a hole size to precision requirements. It is difficult with a portable drill to do close tolerance work. However," he adds, "because SKIL Drills are smooth-running and are built for an ease of operation with greatest accuracy, this type of assembly work can be accomplished with great savings in time.

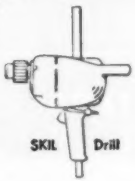
"Also, because all of our drilling is done in aluminum we have an additional drilling problem." Mr. Johnston explains, "Aluminum has the peculiar property of not guiding a drill bit, as will other metals such as steel. Therefore, we insist on SKIL Drills because they deliver turning power to the drill bit cutting edge at a constant, wobble-free speed, thereby assuring utmost drilling accuracy."

"SKIL Drills Are Easiest To Use," says Alice Waren—"Because of SKIL design, these drills are less tiring than others and more comfortable to the worker," says Alice Waren. She is using the Model SKIL 45 Drill in the assembly of an airplane door mechanism.

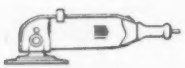
"SKIL Speed and Accuracy Are A 'Must' In This Work . . ." says Don Workman—Here Mr. Workman is using the Model 45 SKIL Drill in the assembly of a life raft door for a big bomber. "Lives depend on the accuracy of our work," he says, "and SKIL Drills deliver the speed and accuracy we need to do a precision job."



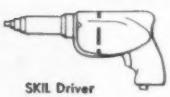
SKIL Saw



SKIL Drill

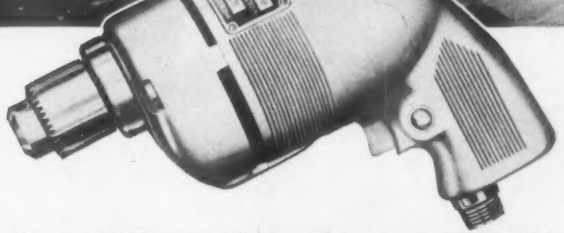


SKIL Disc Sander



SKIL Driver

SKIL Grinder



SKIL Drill—Model 45
Compact ¼" drill. Capacity in steel: 0" to ¼"; in hardwood: 0" to ½". No-Load speed: 1800 r.p.m. Overall length: 6⅛". Weight: 3 pounds.

See Your SKIL Distributor for Demonstrations and Complete Information

SKIL Belt Sander

SKIL

THERE ARE 26 SKIL DRILLS . . .
ONE FOR EVERY NEED

●

SKIL Products are made only by SKILSAW, Inc.
5033 Elston Ave., Chicago 30, Illinois
SKILSAW Factory Branch Offices in 34 principal cities
In Canada: Skiltools, Ltd.
3601 Dundas Street West, Toronto 9, Ont.

Like to look at our mail?

We've got a letter here from the Bloch Brothers Tobacco Company of Wheeling, West Virginia. They tell us about a Centrifugal Refrigerating Machine of ours that was installed in 1931.

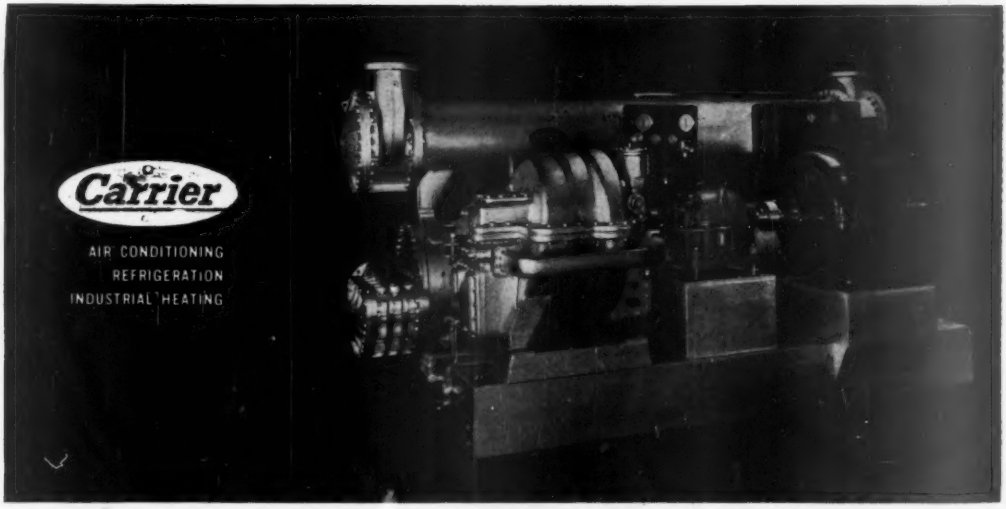
In 20 years, they say, they needed service just *once*. And that was a few years back when a bearing was replaced and the motor characteristics changed.

Other than that, the machine hasn't been touched!

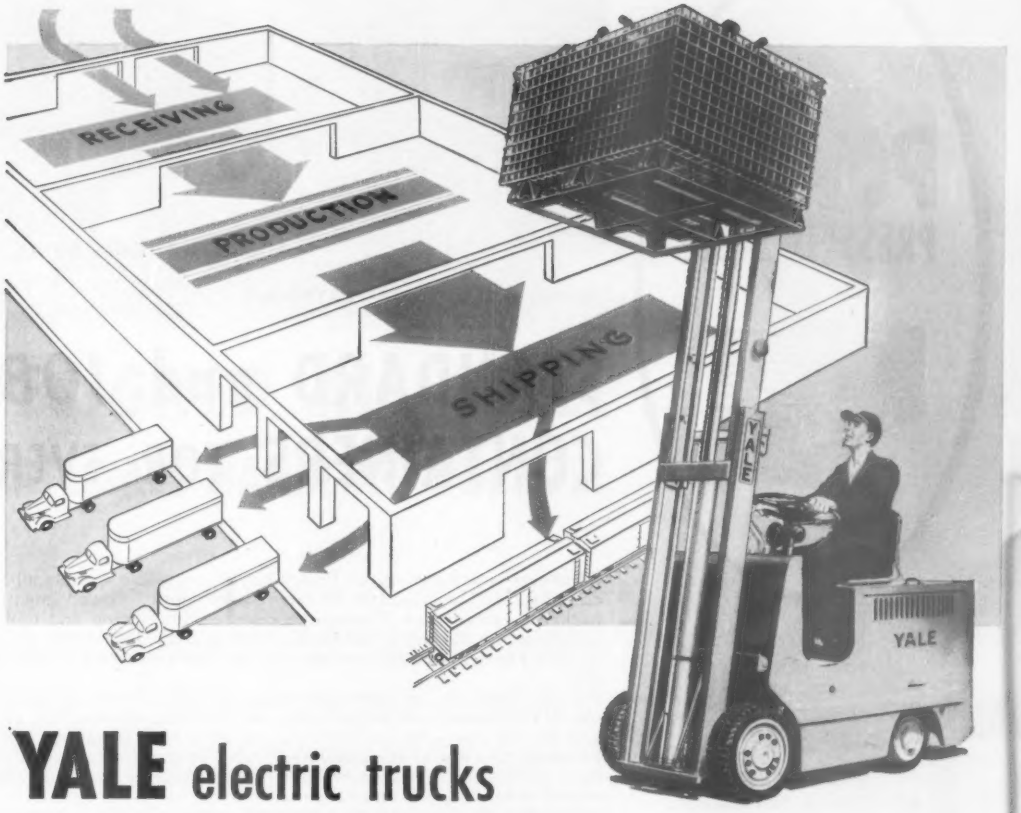
But we get lots of letters like this. At Meadville, Pa., American Viscose Corporation has a Centrifugal that has been on the job for 24 hours a day since 1929. Whitman Chocolate of Philadelphia has one that we installed in 1924. And so on.

Our Centrifugal Machines economically get temperatures down to minus 150 degrees F. Ammonia, chlorine and other gases can be directly condensed. And reaction temperatures can be closely controlled.

Write us for the whole convincing story about the Centrifugal. We'll show you how it can save you money on installation, operation and maintenance. Carrier Corporation, Syracuse 1, N. Y.



The self-contained Carrier Centrifugal Refrigerating Machine. Available in capacities from 100 to 2500 tons. Any type of motor or turbine drive is applicable.



YALE electric trucks travel this route longer—*for less*

THESE EXCLUSIVE YALE FEATURES KEEP TRUCK OVERHEAD DOWN

- **Exclusive Hypoid Gears give greater drive power, longer drive life.**
- **Exclusive Involute Spline Drive Shaft, built for continuous resistance to wear-fatigue, outlasts all others.**
- **Special Rolled Lift Channels with lifetime sealed ball bearing channel rollers won't wear, won't spread — need never be replaced.**
- **Exclusive YALE design makes every part accessible for fast, cost-saving "minute-maintenance."**

YOU CAN SAVE up to 75% of your production, receiving, shipping and storage handling costs with dependable, longer-lasting YALE Electric Trucks. Discover for yourself the *extra* savings YALE Electric Trucks can bring you—in operating, maintenance and replacement costs. Fill out and mail the coupon today.

YALE & TOWNE

The Yale & Towne Manufacturing Co., Philadelphia 15, Pa.

YALE is a registered trade mark of The Yale & Towne Manufacturing Co.

MAIL THIS COUPON TODAY

The Yale & Towne Manufacturing Co., Dept. 31
Roosevelt Boulevard & Haldeman Ave., Philadelphia 15, Pa.

I want the most from materials handling savings.

☐ Please send free detailed literature on the YALE ELECTRIC TRUCK.

☐ Please have your local Representative call on me.

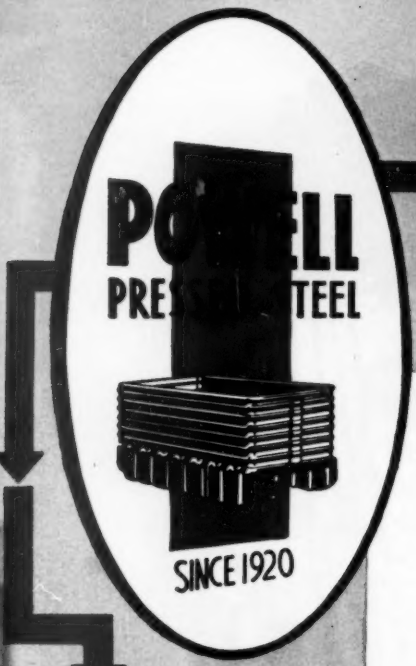
COMPANY_____

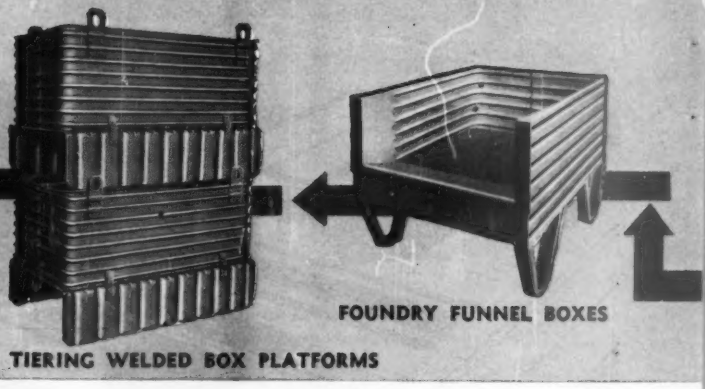
NAME_____ TITLE_____

STREET_____ CITY_____ STATE_____

In Canada write: The Yale & Towne Manufacturing Co., St. Catharines, Ont.

YALE GAS AND ELECTRIC TRUCKS • YALE *WORKSAVERS* • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS





FOUNDRY FUNNEL BOXES

TIERING WELDED BOX PLATFORMS

STANDARD and *JOB*-CONTAINERS FOR EVERY

Whatever your handling job Powell has a serviceable durable all-steel container that will exactly fit job requirements. Powell engineers, backed by more than 30 years experience in designing and building containers for moving or storing purposes of every description, are best qualified to help you achieve the most efficient handling system possible.

For more inexpensive plant operations, for better materials handling, call in the Powell man in your area—he is a materials handling expert and the one man who can best help you lower your handling costs.

Pictured are a few of the many basic types of containers designed and built by Powell. These containers can be made in size and style to exactly meet your job requirements.

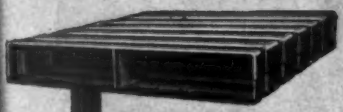
TIERING WELDED BOX PLATFORMS—Heavy duty boxes that will hold anything . . . can be tiered to almost any height.

FOUNDRY FUNNEL BOXES—For handling hot castings these sturdy open end boxes are doing a job for America's leading foundries.

FOUR-WAY CRANE TIERING BOXES—Standard boxes with slots for four-way lift truck entry . . . crane lift attachments.

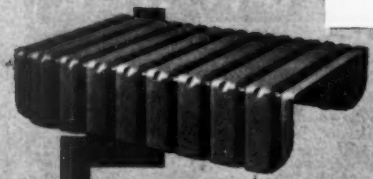
HOPPER BOXES—Ideal for small parts handling. Powell Hoppers eliminate need for special table. Can be made with various door openings. Available in slanted gravity feed or straight bottoms.

ROLL-OVER BOXES—For use where volume and constant material flow are essential. Powell Roll-Overs enable quick filling of press hoppers, conveyors, etc.

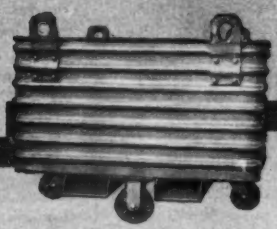


ALL-STEEL
REVERSIBLE PALLETS

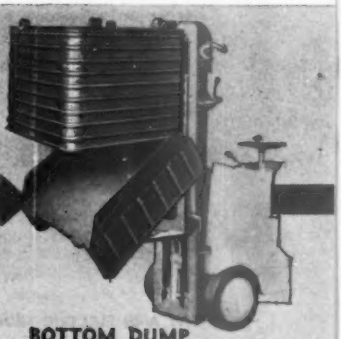
NESTING PALLETS



LIFT TRUCK
PLATFORMS



ROLL-OVER CASTER BOXES



BOTTOM DUMP
PLATFORM BOXES

FOUR-WAY CRANE TIERING BOXES

HOPPER BOXES

ROLL OVER BOXES

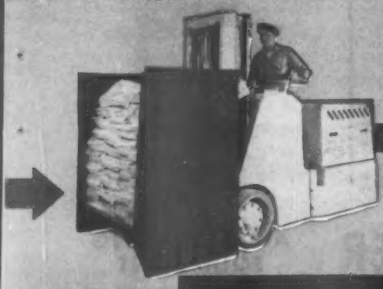
DESIGNED ALL-STEEL MATERIALS HANDLING PURPOSE

DUMP BOXES—Dumps for every purpose . . . sizes can be built for your particular operation.
BAR CARRIERS—If you're handling long items, rails, pipe, conduit, tubing, bars, etc., a Powell Carrier can be built to do a more efficient job.
STACKING PALLET-RACKS—Durable racks built to handle large or bulky materials, such as crank shafts, which will not readily carry in a box type unit.
WAREHOUSE UNITS—For handling those hard-to-handle materials, bagged goods, etc., the Powell Warehouse Unit is unsurpassed.
CASTER-BOTTOM DUMP UNITS—Extremely flexible caster bottom dump boxes can be handled in normal manner with lift truck, can be roll-over dumped, can be tiered—and they will roll easily on their own casters.
LIFT TRUCK PLATFORMS—Standard units that can be made in many sizes and styles to best suit your particular job.
NESTEEL STACKING PALLETS—Sturdy, one-piece, all-steel pallets that nest one into the other. Ideal for ship-and-return use. (Special Bulletin on Request.)
WELDED STEEL PALLETS—Standard all-steel pallets of basic designs to suit your needs.
SPECIAL—If you have a need for a special container remember Powell is the world's most experienced manufacturer of all-steel handling containers. Call your Powell representative or write direct.

CASTER BOTTOM DUMP UNIT

BAR CARRIERS

PALLET RACKS



WAREHOUSE STACKING UNITS

Please address inquiries to Dept. 112

THE POWELL PRESSED STEEL CO., HUBBARD, OHIO
ORIGINATORS OF COLD FORMED ALL STEEL HANDLING EQUIPMENT
(In Greater Youngstown)

POWELL PRESSED STEEL Since 1920

American Blower... a time-honored name in air handling

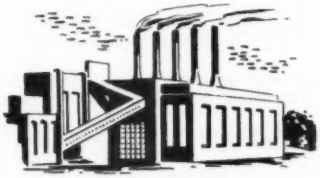
Oklahoma City has a conveniently located American Blower Branch Office to provide you with data and equipment for air handling. You can reach American Blower in Oklahoma City by calling 2-0695. In other cities, consult your phone book.

HEATING LARGE AREAS

Ability to place heat *where* it's wanted and in the *quantity* needed is an advantage that makes American Blower Unit Heaters ideally suited for heating such large areas as warehouses, garages and auditoriums. These dependable unit heaters force heat down to the working level, heat up quickly with little time lag. They are low in first cost, and deliver more heat per pound of material than any other known system of heating. Models available for steam or hot-water heating systems, also self-contained gas-fired models.

DUST PROBLEM?

If you have a problem along the lines of dust and fly ash collection, American Blower will be glad to help you. We have a wealth of experience in this field that covers not only dust and fly ash removal in industry and public utilities, but also the recovery of valuable materials from air. In addition to local, on-the-spot assistance from our branch office personnel, a modern, fully equipped dust laboratory is maintained in Detroit to serve you.



MORE EFFICIENT POWER

If you're faced with the need of expanding or enlarging power plant facilities, consult American Blower. You'll find our Mechanical Draft Fans help you meet the most exacting power plant requirements. High static efficiency, low RPM, low tip speed and low inlet velocity are but a few of the many reasons these fans have enjoyed such wide acceptance. Types for both forced and induced draft work.

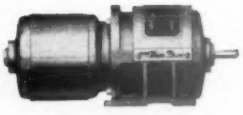
YOUR BUSINESS

No matter what business you're in, you can count on American Blower heating, cooling, drying, air conditioning or air handling equipment to do the job better, more economically. Phone or write our nearest branch office for data.

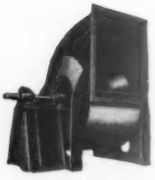
Unit Heaters

Mechanical Draft Fans

Dust Collectors



Gyrol Fluid Drives



Industrial Fans

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

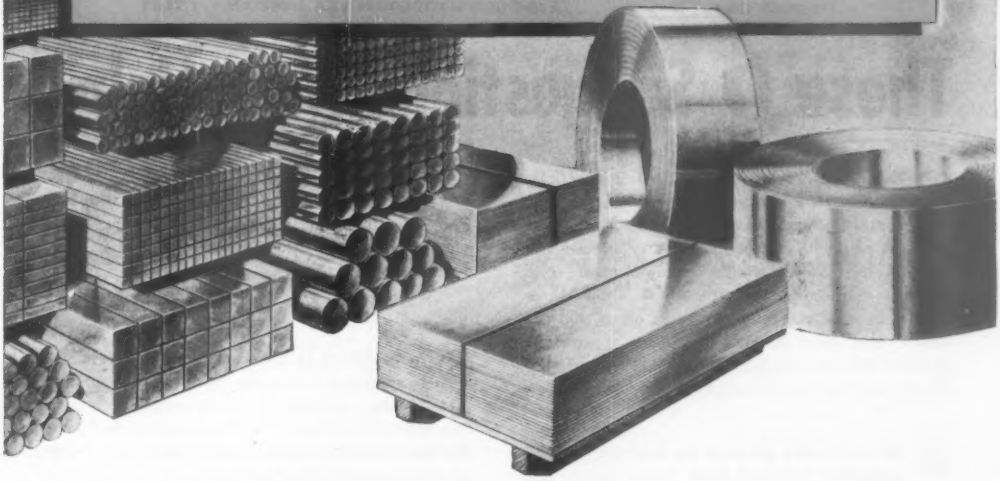
Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

YOUR BEST BUY **AMERICAN BLOWER** AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • ACME CABINETS • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • BOSS HEATER • TONAWANDA IRON

Looking for a better rust preventive for cold rolled products?

Investigate the advantages of Gulf No-Rust



Gulf No-Rust provides positive protection against corrosion for cold rolled steel products under severe conditions of storage and shipment. It is ideal for products exposed to widely fluctuating ambient temperatures and humidities, highly corrosive atmospheres, and outdoor weathering.

Gulf No-Rust is available in several grades; one, an oil-film type that has strong polar characteristics; and several petrolatum-type materials which provide films of varying degrees of toughness. All are easily applied, provide good coverage per unit of volume, and are easily removed by vapor degreasing or by washing with Gulf Stoddard Solvent.

If your customers report cases of surface spoilage due to corrosion, it will pay you to investigate the advantages of Gulf No-Rust. Ask a Gulf Lubrication Engineer for further details. He will fully inform you on the suitability of Gulf No-Rust for various methods of application, types of metal surface, size of product, length of time for which protection is required, conditions of storage or shipment and ease of removal. Write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation · Gulf Refining Company,
Gulf Building, Pittsburgh 30, Pennsylvania.

GULF SERVES INDUSTRY

To Management:

We suggest you bring this page to the attention of your Purchasing, Production and Maintenance Depts. One or more of its paragraphs may lead to the solution of critical procurement problems in your plant.

Stymied by Steel Shortages?

These 6 Suggestions May Help!

(1) **Handicapped by restrictions on nickel-bearing 18-8 stainless?** If you are, straight chrome stainless may enable you to continue your stainless production. For instance, type 430—the most widely used straight chrome steel—can often be substituted for type 302 in applications subject to mild corrosion. Ryerson offers you the largest and most diversified stocks of straight chrome stainless including types 405 and 430 sheets, type 430 plates and type 416 bars.

(2) **Manufacturers plagued by seamless tubing scarcities** will find that bright-finish, hot rolled welded tubes in 11 gauge and 3/16" walls can often be used as an alternate for seamless tubes in the same sizes. These welded tubes are in good supply at Ryerson in a wide range of round and square sizes.

(3) **If you are having trouble adopting interim and lean alloys** because of the unfamiliar analyses of these new steels, let Ryerson metallurgists work with you. We test all alloys and can assure the hardenability desired. Heat treatment guide with every shipment.

(4) **Faced with the problem of finding workable substitutes for special plate shapes?** You may find the right answer in forgings. You can get complete information on forgings from our sales representative.

(5) **In addition to these alternate steels** we recommend a superior babbitt—Glyco Babbitt Metal—instead of more expensive and restricted high tin babbitt. Product of an exclusive Ryerson formula, Glyco is a lead base alloy with physicals equal to tin base types.

(6) **And, remember**—please give us full information when ordering. For instance, when we know the exact size or length multiple—the cut size or length you will actually use—we may be able to fill your order from smaller pieces or "shorts." Knowledge of acceptable alternates also helps. But, no matter what your requirements, we urge you to check with us. We will always work closely with you—help you get what you need.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

FACTORY
MANAGEMENT and MAINTENANCE
WHAT YOU NEED TO KNOW FROM WASHINGTON ★ WHAT YOU NEED TO
Mobilization Communique No. 18

The Controls You Face in 1952

By CARROLL W. BOYCE • National Affairs Editor, FACTORY

PART I • MATERIAL AND PRODUCTION CONTROLS.....DECEMBER, 1951

PART II • WAGE CONTROLS .....IN THIS ISSUE, PAGE W-1
SALARY CONTROLS .....PAGE W-4
DEFENSE NOTES .....PAGE W-6

WAGE AND SALARY RULES apply across the board—every rule applies to every manufacturer. So there are relatively few rules. And there has been little "controlese" injected into the wage and salary picture. There are, however, some new alphabetic combinations you'll need to understand:

ESA • The Economic Stabilization Administration. This is the top-dog outfit in all economic controls. It is responsible not only for wage and salary controls, but also for price controls (through OPS—the Office of Price Stabilization).

WSB • The Wage Stabilization Board. An 18-man tripartite board (labor-management-public), responsible for determining and enforcing wage controls. (For a full description of the WSB, see FACTORY for November 1951, page 68.)

SSB • The Salary Stabilization Board. A board of five public members, responsible for determining all policy on salary control. (For a full description see FACTORY for December 1951, page 68.)

OSS • The Office of Salary Stabilization. This is the "operating" group, responsible for administering the policies of SSB.

GWR • The initials stand for General Wage Regulation. The initials are always followed by a numeral, and indicate the number of a regulation issued by WSB.

GSSR • This is a General Salary Stabilization Regulation. The initials are always followed by a numeral, and indicate the number of a regulation issued by SSB.

NLRB • The National Labor Relations Board. *This board has nothing to do with wage and salary controls.* The NLRB operates under the Taft-Hartley Act—properly known as the Labor-Management Relations Act.

FLSA • The Fair Labor Standards Act — also known as the Wage-Hour Law. Employees who are *exempt* from this Act come under SSB rather than WSB—unless they are represented by a union for bargaining.

WAGE CONTROLS

What's Controlled?

Unless otherwise provided in General Wage Regulations (GWR's) issued by the Wage Stabilization Board, all wages are frozen as of Jan. 25, 1951.

"Wages," as defined for this freeze, includes: straight-time pay, vacations and holiday payments, night shift and other bonuses, incentive payments, year-end bonuses; employer contributions to pension of annuity funds, insurance, or welfare benefits; payments in kind; and premium overtime practices and rates.

There's one broad, general exception to the freeze: You can put into effect any wage increases required by the Fair Labor Standards Act (the Wage-Hour law), or any other federal or state law.

More on next page

What Can You Do?

INCREASES IN DIRECT WAGES · Regulations of WSB provide for increases in direct wages in four specific situations:

1. When wages have gone up less than 10% since Jan. 15, 1950. You can raise wages that much without even bothering to get WSB approval.

2. When the cost of living rises. This can be done by means of a negotiated escalator clause that calls for automatic adjustments. Or it can be done by adjustments (negotiated or otherwise not more often than one each six months). The increase doesn't have to be as much as the rise in the cost of living, but the percentage increase cannot be more than that.

Cost of living increases can be "piled on top" of the general 10% permitted increase. That is, you can give 10%, plus increases in the cost of living since Jan. 25, 1951.

Escalator clauses negotiated after Jan. 25, 1951, must contain provisions for a downward revision if the cost of living drops (but not below the wage level on the date that clause went into effect). This restriction does not apply to escalators in effect before Jan. 25, 1951.

All increases up to the "cost of living level" can be made without prior approval of WSB. If you want to raise wages above that level, you have to make special application to the Board and wait for approval.

3. When your wages have historically been "in tandem" with the rates of another plant. If you can show the Board that your rates have always conformed to a pattern set by another plant or plants—and that you had temporarily fallen behind when you were caught by the freeze—the Board will OK a raise large enough to get you back in line. "Re-establish the tandem relationship" is the technical term for it.

But don't forget, you can't do this until you have the OK from the Board.

4. When you're losing employees or are unable to hire because of "inter-plant inequities." You'll get an OK from the Board to raise wages *if* you can show that you're suffering a hardship because you're out of line with other companies competing with you in the same labor market area.

Don't move on your own initiative. Wait for the go-ahead from the Board. This business of inter-plant inequities isn't black-or-white, and the Board may not agree that you're suffering a hardship.

5. Increases to adjust wage inequities within your plant. WSB recognizes that "intra-plant wage rate inequities are a major source of industrial unrest," and that "sound programs" to correct such inequities can help improve morale and boost defense production.

WSB will, *on application*, approve adjustments to correct intra-plant inequities *if* they are not used as a substitute for a general wage increase and meet certain other standards. WSB will consider both "comprehensive job-rate review" plans and "individual job-rate adjustments."

A "comprehensive job-rate review" must meet these criteria:

1. There must be a systematic realignment of wage rates.

2. The rates must be "anchored" to a substantial number of key jobs in the existing rate structure.

3. The level of "job rates" may not be increased an average of more than 1%.

4. The payroll itself, including "red circle" wages which stay above the approved rate until the employee leaves the job, may not increase immediately more than an average of 3%. (Employees in a job whose rate is cut may retain the higher rate.)

5. Where you put in a range of rates for a job, the maximum of the range should not be more than 25%, on the average, above the minimum. In working out the 25% average, the spread between top and bottom in any range should not be less than 15% nor more than 35%.

"Individual job-rate adjustments" should meet the following conditions:

1. The adjustments must produce a more orderly relationship between jobs of the same skill.

2. Not more than 30% of the employees in the plant or unit may be affected.

3. Average straight-time hourly rates may not rise more than 1%.

4. No employee may be increased more than 15 cents an hour.

If you have an unduly compressed wage structure—or wish for any other reason to exceed the limits set above—you can make application to WSB for approval on a case-by-case basis. That's true whether you base your application on comprehensive job-rate reviews or individual adjustments.

MERIT AND LENGTH-OF-SERVICE INCREASES · Just how much you can give in merit and l-o-s increases will depend on which one of these three groups you're in as regards job classification schemes and past practice:

1. If you have a job classification scheme with definite rate ranges and a written policy regarding merit and l-o-s increases. You can continue to follow your past practice. Or you can use the 6% option (see No. 2, below).

2. If you have a job classification scheme with definite rate ranges, but no set policy regarding merit and l-o-s increases. You can raise the total straight time pay of all employees in each group by the same percentage you raised it last year, or by 6%, if that is greater.

So long as no employee exceeds the maximum for his range, you can distribute the total allowable increase any way you want among the employees in the group.

3. If you use a "random rate" method of setting rates. You can raise total straight-time pay of a group by up to 6%. But no individual may be raised more than 10%, or to a rate higher than the highest rate in the group.

Merit and l-o-s increases up to the limits indicated above are automatically approved under GWR-5. To increase any individual above these limits, you must file a special application with WSB.

"FRINGE" BENEFITS (except special bonuses) · You still have to check with WSB on pension increases, but the general rule is that you can grant an increase if you are currently below "industry or area practice . . . in amount or type."

Health and welfare benefits are now governed by GWR-19, plus a special "resolution" of the Board (Number 78). In general, individual benefits are limited in amount to what about 90% of employers are doing already.

There are three things you will want to note carefully about the regulation:

1. The limits are on benefits to the employee, not cost to the employer.

2. The limits are on individual benefits, not on any total amount of benefits, or "package." Few employers are at the limit on all benefits, so everybody will have some room to improve.

3. Benefits within the limits need not be offset against the 10% catch-up formula. If you have already done this, you can petition WSB for a "re-accounting" of your allowed 10%. You can't, however, use any "unexpended" part of your 10% to take a given benefit above the limit.

When it comes to details, WSB has specified the things you *can't* do without prior approval. If you stay within these limits, you merely notify the Board. Unless you are advised to the contrary within 30 days, you can put the benefits into effect.

Here are the benefits you *can't* give in six main categories:

1. Temporary disability. Any "sick leave." Any other benefits running more than 26 weeks. Waiting period of less than seven days for illness payments. Compensation of wage loss which averages more than 60% of average weekly earnings of insured group.

2. Hospital expense. Any "unusual" type of benefit, like special nursing). Full payment for private room. Blood plasma. Rest cures. Treatment of tuberculosis, nervous, or mental cases for more than 30 days.

3. Surgical expenses. Any fee schedule in excess of the Veterans' Administration plan, or the standard $200 commercial insurance fee. Any "unusual" benefits, like dentistry. Plastic surgery (for cosmetic or beautifying purposes). Major surgery at home or office.

4. In-hospital medical expense. Payments in excess of $5 a day. Payments for more than 70 days.

5. Group life insurance. Any death benefit not on a group basis, or allowing cash-surrender, paid-up, or non-forfeitable loan value. Life insurance which averages more than 85% of the average earnings of the insured group (or $1500, if that's more).

6. Accidental death and dismemberment benefits. Any benefit not on a group basis. Insurance with face value more than 85% of average annual earnings of the insured group (or $1500, if that's more).

There's an important exception for companies with contributory health and welfare plans:

If employees pay 40% or more of the cost, there's no limit on the amount of any individual benefit.

SPECIAL BONUSES · You can continue to pay special bonuses without prior WSB approval *if* they conform to previous practice as to average amount per employee. There are two strings tied to that blanket approval: You can't pay bonuses more than once every three months, and the bonus can't be more than 25% of the employee's total wages and any other compensation he has received. (Not counting the bonus.)

INCENTIVE PAY PLANS · If you had an incentive plan on Jan. 25, 1951, you may do the following without prior approval of WSB:

1. Change rates when there is a change of method, tools, materials, design, quality requirements, work assignments, or other production job conditions.

2. Bring new or changed jobs in under the incentive plan.

3. Change from one type of incentive plan to another, *if* the new plan results in the same average premium pay.

On making such changes in an incentive plan, WSB requires you to meet one of these conditions:

1. New or changed rates must be based on (a) a written agreement in force on Jan. 25, or (b) the "engineering principles and allowances" in effect on that date.

2. If rates are set by estimate or negotiation, you must maintain the relationship between job content and earnings.

If you wish to make other revisions in an incentive or piece-work plan, or install a plan for the first time, you must get prior WSB approval.

To get approval, you must pass this seven-point test:

1. Attach to your application a description of

More on next page

the methods by which the standards have been established.

2. Include evidence of the standards or production records applicable to a significant number of the jobs or employees to be covered by the plan. Then certify that the same procedures will be followed in extending the plan to other jobs or employees.

3. The plan should not increase unit labor costs. If it does, you must show that the higher level of earnings will not be unstabilizing and will not create inequities within your plant.

4. The plan must provide an earnings opportunity —sometimes called a "reach"—of at least 15% above the day, or hourly, rate for the job.

5. The plan must have safeguards for correcting and maintaining the standards or rates.

6. The plan must contain minimum wage guarantees. These and other pay practices connected with the plan must be described.

7. Initial approval by WSB will cover only three months from the approval date. At the end of that time, you must report on how the plan has operated, showing what happened to average hourly earnings and to production. If you don't hear anything in the following 30 days, you can consider the plan has final approval.

If you want to install some other type of incentive plan or a plan based on criteria different from the above, you may still seek approval. WSB says it will consider these on a case-by-case basis.

You can apply the 10% catch-up and cost-of-living formulas to incentive plans. This is how you can do it without having to get approval from WSB:

1. Apply the formula to the piece rates where you pay straight rate.

2. Apply it *only* to the base rate where you have a base-pay-plus-incentive.

3. Make a side payment, sort of a bonus, of an amount reached by applying the formula to straight-time earnings. (This alternative has the advantage of not monkeying with your incentive system, simplifies cutbacks if and when living costs drop.)

If you want to apply the wage-increase formulas some other way, then you must file for specific approval.

NEW PLANTS · The wage rates established for a new plant—or a new enterprise in an existing plant—are subject to review by WSB. In general, you can expect approval to be routine if the rate structure conforms to existing industry and area practice. (The knotty cases crop up where industry practice and area practice are markedly different.)

SALARY CONTROLS

Who's Covered?

All management people, including executive, administrative, and professional personnel — *unless they are represented by a union for bargaining purposes.* (Where there is a union, WSB rules apply.)

Another way of saying it is that the rules of the Salary Stabilization Board apply to everyone in the "exempt" group—exempt, that is, from the federal 40-hour law (Fair Labor Standards Act).

It is not necessary that the employee be paid a salary to come under SSB rules. Foremen and other supervisors, even though paid by the hour, come under SSB if they are "exempt" personnel.

What's Controlled?

All compensation is controlled. The definition is all-inclusive, just as it is for wage earners. Except as provided in General Salary Stabilization Regulations (GSSR's), all pay for covered personnel is frozen as of Jan. 25, 1951.

What Can You Do?

As revised to take effect Feb. 1, 1952, GSSR-1 covers about 90% of the adjustments commonly made among salaried employees. It includes the 10% catch-up formula, cost-of-living formulas, differentials, extended work weeks, inequities, merit and length-of-service increases, promotions and transfers, new employees, and new plants.

Special regulations cover bonuses (GSSR-2), stock options and stock-purchase plans (GSSR-4), and commission salesmen (GSSR-5). The old GSSR-3 has been revoked; merit increases are covered in the revision of GSSR-1.

Here's how the various regulations have modified the "freeze" up to the present time:

GENERAL INCREASES · There are five situations in which you can raise the general level of salaries in your plant. In the first four, you can act *without* waiting for SSB approval.

1. Salary increases up to an average of 10% above Jan. 15, 1950, for any group. This is the same as WSB's 10% catch-up formula.

Don't charge against the 10% any increases based on: merit, length of service, promotions, transfers, and new or changed jobs.

Do charge against the 10% the prorated cost of new or improved vacations, holidays, pension and welfare plans, and the like.

2. Cost-of-living increases. Where you had a cost-of-living contract covering salaried employees before the Jan. 25 "freeze" date — like General Motors did—you can still follow it. But SSB won't let you make a new c-of-l contract (as WSB will for wage earners).

3. Increases to maintain differential with wage earners—the "ratio formula." This is the closest thing to a living-cost allowance for salaried workers, because it gives you a salary-increase fund equal, on a percentage basis, to increases you have given hourly employees under WSB rules. So when you give, say, a 2% c-of-l raise under WSB permission, you then have a fund of 2% of the salaried payroll from which you can give salary increases.

Here's how you must distribute this fund:

First, you must restore normal differentials between the pay of foremen and other supervisors and the pay of those they supervise.

Second, you must correct any inequities existing within your salaried group.

Then, what's left in the fund you can pass around to any in your salary group, including those who got increases under the first two steps. However, from this remainder of the fund no employee may get an increase of more than the percentage used in computing the fund.

For example: A foreman might get a 2% increase to restore his differential over the machine operator he supervises and might be given as much as another 2% from what's left in the fund.

Employers in making this distribution must guard against creating new inequities.

4. Extended work week. You can compensate foremen and supervisors who work longer than the normal week. The extra pay must be straight time, unless it has been your practice to pay more. Otherwise, you must get approval to pay more. (By special order, this applies to engineers, too.)

5. Inter-plant inequities. If you make application, SSB will approve increases to bring salaries in line with those commonly paid in your industry or your area.

INDIVIDUAL INCREASES · There are five cases in which you may increase the salaries of individual employees:

1. Merit and length of service. Where you have a salary range, you must follow your plan. But you may not give increases averaging, over a year's time, more than 6% of base pay. No employee's salary may go higher than the top of the range. In case you think that 6% looks liberal, note this: You are charged for increases given to employees who later are separated.

Where you have random salaries and no plan for merit increases, you may give for this purpose up to 6% a year, but not more than 10% to any individual.

2. Promotions and transfers to higher paying positions. Where the position has a salary range, you may pay the employee a salary within the range comparable with that of other employees with the same qualifications.

Where there is a "random salary" for the position, you can pay him what others of comparable ability are getting.

Note: You must start the higher salary within 90 days. And a responsible official must attach to the payroll records a sworn certificate citing the circumstances of the promotion or transfer.

3. Demotions and transfers to lower paying positions. You can't pay the demoted employee more than the top salary for the lower-paying job. If he worked in the higher job at least four months, the pay cut can be made gradually—over a period of six months.

Where the change results from illness, disability or old age, you don't have to cut the man's pay if he was in the higher job three years. Nor do you have to cut the pay of an employee transferred to another plant.

4. New employees. Where you have a range of salaries, you may pay a new man a salary within the range "commensurate with his ability, experience, and training."

Where you have random salaries, you can pay him what you pay others with comparable duties and responsibility. Or you can put him on at a lower salary with the right to move him up — within 120 days—to the regular salary.

5. New or changed jobs. You can pay the employee what you pay others in similar positions. "Slight or inconsequential changes in duties" don't count. You must show, in a sworn certificate, that the new or changed position was necessary and established "in good faith."

NEW SALARY SCHEDULES · You must file for approval. They will be judged on the basis of your past practice and custom in the industry, the area, or the occupation involved.

NEW PLANTS · You must file your proposed salary schedule with SSB. If, in three weeks, you have no word on it, you can put it into effect *if you notify the employees that the salaries are only "interim."*

Salaries should be in line with those in the same or comparable industry in the same or comparable area.

AUXILIARY PAY PRACTICES · You may follow your pre-freeze plan or practice with respect to incentive plans, change in shift, overtime or

More on next page

premium pay, severance pay, pensions and welfare plans, and other auxiliary pay practices.

PROFIT SHARING BONUSES · These are controlled by GSSR-2. It divides bonuses into three categories:

1. Contractual bonuses. These are bonus contracts, in effect before the freeze, where there is a definite formula for computing and allocating the bonus. You can carry out the contract, even if it means a bigger bonus to the worker. Don't change the formula, though.

2. Established bonus plans. These plans have a definite formula for computing the bonus kitty, but distribution is discretionary. You can figure the bonus kitty as before, but in dishing it out you must follow your usual practice, with this restriction: You can't pay a bonus higher than you paid before.

3. Discretionary bonuses. Where both the computation and allocation of bonus is discretionary, your bonus kitty is limited, in dollar amount, to what is called a "base period bonus fund." This can be either (1) what you passed out in 1950 or (2) the average for any three years 1946 to 1950. You may increase the fund only as employees are added to the bonus group. You must cut the fund as employees leave the group.

You may distribute these bonuses according to custom, but you can't go higher than the amount you gave any one employee in the base period.

Where you have not paid a bonus since the war, you may compute, on an annual basis, what you have not used under the 10% catch-up or the "maintenance of differential" rule. You can give this as a bonus.

Since the 10% really covers a past period, you can still add what's left under the 10% to salaries, despite the bonus.

But under the maintenance of differential—so-called "ratio formula"—if you figure it annually and give it as a bonus, it applies for a year forward.

STOCK OPTIONS AND PURCHASE PLANS · These are controlled by GSSR-4. Here are the rules for each:

1. Stock options. You don't need approval to grant a "restricted stock option" as defined by the Revenue Act of 1950—if the option price is at least 95% of the market price. This is not considered a salary "increase." There are certain technical conditions, however, which must be met.

2. Stock purchase plans. These, too, are not considered a salary "increase" if the employee pays at least 95% of the market value and other technical conditions are met. One of those conditions: Until the stock is paid, the employee must apply any dividends he gets to the purchase price.

DEFENSE NOTES

What Budget Cuts Mean

We're now over the hump in military spending. Requests for military funds in the 1953 budget (July 1952-June 1953) will be down perhaps 10% from the 1952 budget. Depending on Congress' mood, actual appropriations may be even less.

Don't misinterpret this as meaning a cutback in the military production program.

There's a time-lag of one to two years between appropriations and actual production. Furthermore, a big chunk of the appropriations in the past two years has been for construction of production facilities. That's beginning to taper off.

Most of the money appropriated from here on out will be for military *goods*, rather than *facilities*. Even with a smaller total budget, the amount for military goods will be larger than in the past.

So talk of slacking off or military cutbacks is just careless talk. Productionwise, the military will take an increasing share of our output through 1952.

"Scheduling" on the Way

Be sure to add the word "scheduling" to your 1952 vocabulary of Washington controlese. You'll hear it used a lot more as the year goes on.

So far, most controls have been "negative." You've been told there were certain things you could not do. But the initiative has been with the manufacturers.

Now the initiative begins to move over to the controllers. They will tell you—affirmatively—what to make, when, and for whom.

To date, scheduling has been pretty much limited to heavy power equipment — generators, switchgear, transformers, and the like. That's all provided for by NPA Order M-44. Each manufacturer sends NPA his monthly schedule. NPA can revise it any way it sees fit — even transfer orders from one manufacturer to another.

Now we're going to have scheduling of many components. First will come items that are made by only one or a few manufacturers — hot metal cranes, engines and turbines, heat exchangers, and the like. One of the first widely made components likely to be scheduled is valves.

At least at the start, scheduling will be on a selective basis—specific products and specific manufacturers. Then will come general classes of products and whole industries.

One high NPA official predicts that by the end of 1952, "virtually every component of any military importance will be scheduled—along with many components for essential civilian uses."

LOOKING AHEAD IN LABOR

Looking ahead in 1952

STABILIZATION

Steel was the first big hurdle for stabilization, both wage and price. Next: coal, in April.

What Murray gets from steel is the jumping off point for Lewis in coal. These settlements will not force a scrapping of wage-price controls. Rather, they will stretch wage rules, raise higher targets for other unions to shoot for.

Outlook remains for steadily rising wages under the wage board's cost-of-living formula. On top of this, add more for assumed increase in productivity. Then some more for fringe benefits.

Pensions, health and welfare plans, paid holidays, vacations, and severance pay will be allowed to come up to what most other employers give. Where you refuse, unions will try to force you—with Wage Stabilization Board help if they can get it.

New trails will not be blazed on fringe stuff, unless Murray puts over the guaranteed annual wage in steel. CIO meatpacking union is talking tough on the annual wage, too. But odds are heavily against success.

Possible exception: area-wide pension plans. They may take hold now that the Toledo plan has Treasury Dept. approval for tax deduction of costs. Thus far, UAW-CIO has only a group of 19 small companies in the plan, will press harder for larger auto parts plants.

This could be a first step toward industry-wide pensions. Some manpower experts like it because they feel it will facilitate shifting of workers without loss of pension rights.

STRIKES, DISPUTES, ISSUES

Last year we had no steel or coal strike. If we get by again without a serious stoppage in these basic industries, 1952 may register another drop in man-days of work lost by strikers. Strike loss has dropped in each of the last two years.

More disputes are likely to go to WSB for help in settling. This trend, already evident late last year, will result in fewer strikes. As it completes wage policies, WSB will give more time to dispute cases.

Wages, of course, will still be the big issue in most labor disputes. That's because of rising prices, more taxes. But you may see more trouble over the union shop.

Will Washington help the unions in their drive to spread the all-union shop? Non-operating railroad workers are pressing their demand through a Presidential emergency board. And Murray has been trying to get his before WSB. A nod from either will have repercussions in other industries.

LEGISLATION AND POLITICS

Taft-Hartley repeal will not be pressed in 1952. Instead, organized labor will concentrate on welfare legislation and keeping the Democrats in.

From Congress, labor would like a higher minimum wage of $1.25, larger jobless pay, more housing, FEPC. It may get defense housing aid.

From the voters, labor leaders want a Congress that will listen. But above all, they want Taft licked if he's the Republican candidate. The next Congress won't be much different from this one, from labor's view. That makes keeping a labor friend in the White House crucial.

Truman remains labor's No. 1 choice to lick the Republicans again. There's growing sentiment for Kefauver if Truman drops out.

MANPOWER AND JOBS

Pockets of unemployment in a period of tight labor supply will stay with us in most of 1952. But the unemployment will be of shorter duration.

Tooling up is mostly behind us. Plants cut back on civilian hard goods will get military contracts quicker. More contracts are going into labor-surplus areas.

By the end of the year, an over-all shortage of labor will confront us. Scarcity of skills will intensify. Even so, manpower controls will remain voluntary.

In the wind: A policy urging area committees to make skilled labor more mobile. One way: Protect seniority rights so a skilled man can be loaned to another plant to break a defense bottleneck.

SEE PRACTICAL LABOR RELATIONS, PAGE 202

LOOKING AHEAD IN BUSINESS

Looking ahead in 1952

Business, in general, gives promise of carrying on at a high level in 1952.

Consumer income, even after taxes, is rising gradually. It was $222-billion for 1951 compared to $204.3-billion in 1950. And experts look for a further rise during 1952—maybe up to $232-billion. This means high-level consumer spending, though probably not "scare" buying.

Meanwhile, the defense program keeps a forced draft under much of the economy even if there are some cutbacks in other areas. Defense spending is now running at a rate of $50-billion a year. By 1952's end it will be close to $60-billion, even if the goal of $65-billion is not quite realized.

•

The 1951 record shows that even at a high level of general business there are individual exceptions. A number of industries, like textiles and television, got in trouble by producing more than consumers wanted.

But in 1952 some industries, or parts of them, may get into different trouble because materials shortages prevent them from producing enough.

•

There will also be seasonal variations in industrial activity. While general business is likely to show a slow and steady rise this year, there'll be bumps during the next few months. First quarter of any year is usually jittery, and '52 will be no exception.

To see why, let's take a look at taxes, inventories, and commodity prices.

Taxes: Government tax collections remove money from circulation during the first quarter—more than the government puts in. That means a federal cash surplus. In the past, such a surplus has usually been accompanied by slower retail sales and weakness in stock and commodity prices.

Inventories: Retail inventories—in physical units—are now only about 5 per cent higher than before Korea. But manufacturers' inventories are considerably higher.

Many non-defense manufacturers are already pinched for cash. The heavy first-quarter taxes will make this pinch worse.

So high inventories and urgent cash needs may combine to force further curtailment of soft goods production. The National Production Authority will do its share to limit production of consumer durables lines.

Commodity prices: Pressure on manufacturers to sell off inventories during the first quarter may mean they'll buy less raw materials. This could lead to further weakness in commodities. But it's more likely to hit soft goods than metals.

•

Profits are a big question mark for 1952. Third-quarter 1951 profits were 35% below 1950's same period. Retail and wholesale firms were hardest hit. Manufacturers' profits were down 25%. Higher taxes account for most of the drop in manufacturing profits.

Price ceilings haven't really held firm. They've been increased under one ruling or another. And most companies have also benefited from higher production volume and better output per man-hour. This has largely offset wage increases and higher materials costs.

With costs and taxes continuing high, production volume will again be the key to profits in '52. Outlook is best for basic industrial materials and machinery companies. Defense has helped them lower unit cost.

But food and textile sales have remained slow in recent months. Automobile and electric appliance industries are restricted by materials shortages.

•

The crucial question is whether lower profits in some lines will lead to lower spending on new plants and equipment. Orders for new equipment items usually drop when profits go off. And it may happen this year in non-defense lines.

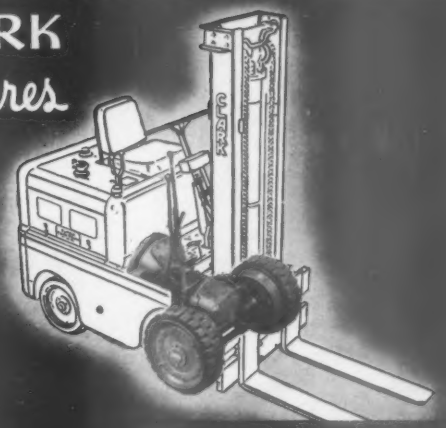
But remember 1952 is an unusual year. There's a tremendous expansion on in the defense-supporting industries. Their profits are still high. And they are being encouraged to order new plant and equipment by fast write-offs for tax purposes.

For the next six months, at least, defense industries will evidently install enough new equipment to more than offset the decline in non-defense lines.

FOR MATERIALS HANDLING INFORMATION AND HELP CONTACT CLARK DEALER NEAREST YOU

ALBANY (LATHAM), NEW YORK
INDUSTRIAL TRUCK SALES, INC.
BALTIMORE 2, MARYLAND
FALLSWAY SPRING & EQUIPMENT CO.
BIRMINGHAM, ALABAMA
M-H EQUIPMENT COMPANY
BOSTON (MALDEN 48), MASSACHUSETTS
BRODIE INDUSTRIAL TRUCKS, INC.
BUFFALO 2, NEW YORK
BRODIE INDUSTRIAL TRUCKS, INC.
CHICAGO 12, ILLINOIS
MODERN HANDLING EQUIPMENT, INC.
CINCINNATI 9, OHIO
ROBERT C. YOUNG & CO.
CLEVELAND 14, OHIO
MATERIAL HANDLING EQUIPMENT CORP.
DALLAS, TEXAS
T. G. FRAZEE
DAVENPORT, IOWA
BIG RIVER EQUIPMENT COMPANY, INC.
DENVER, COLORADO
J. N. MEADE
DES MOINES, IOWA
BIG RIVER EQUIPMENT COMPANY, INC.
DETROIT 2, MICHIGAN
MATERIAL HANDLING SALES CORP.
EUGENE, OREGON
PRESTON FALLER COMPANY
EVANSVILLE 13, INDIANA
W. A. MARSCHKE & SONS, INC.
FT. WILLIAM, ONTARIO
J. H. RYDER MACHINERY CO., LTD.
FRESNO 1, CALIFORNIA
ROBERT H. BRAUN COMPANY
GREEN BAY, WISCONSIN
WISCONSIN INDUSTRIAL TRUCK CO., INC.
GREENSBORO, NORTH CAROLINA
INDUSTRIAL TRUCK SALES & SERVICE CO.
HARTFORD, CONNECTICUT
C. E. REUTTER CORPORATION
HONOLULU, T. H.
PRESSED STEEL CAR CO., INC.
HOUSTON 2, TEXAS
T. G. FRAZEE
INDIANAPOLIS 5, INDIANA
W. A. MARSCHKE & SONS, INC.
JERSEY CITY 2, NEW JERSEY
JERSEY INDUSTRIAL TRUCKS, INC.
KANSAS CITY 8, MISSOURI
LIFT TRUCK SALES & SERVICE, INC.
LITTLE ROCK, ARKANSAS
FRED J. VANDEMARK CO.
LOS ANGELES 22, CALIFORNIA
ROBERT H. BRAUN COMPANY
LOUISVILLE 7, KENTUCKY
W. A. MARSCHKE & SONS, INC.
MEMPHIS, TENNESSEE
FRED J. VANDEMARK CO.
MILWAUKEE 10, WISCONSIN
WISCONSIN INDUSTRIAL TRUCK CO., INC.
MINNEAPOLIS 7, MINNESOTA
MATERIAL HANDLING ENGINEERS
MONTREAL 14, QUEBEC
J. H. RYDER MACHINERY, REG'D.
NEW HAVEN 15, CONNECTICUT
C. E. REUTTER CORPORATION
NEW ORLEANS, LOUISIANA
M-H EQUIPMENT COMPANY
NEW YORK 14, N. Y.
BOND INDUSTRIAL EQUIPMENT SALES COMPANY, INC.
NORFOLK, VIRGINIA
McLEAN EQUIPMENT, INC.
OAKLAND 3, CALIFORNIA
GLEN L. CODMAN CO., INC.
PHILADELPHIA 22, PENNSYLVANIA
BRODIE INDUSTRIAL TRUCKS, INC.
PHOENIX, ARIZONA
ROBERT H. BRAUN COMPANY
PITTSBURGH 33, PENNSYLVANIA
MATERIAL HANDLING, INC.
PORTLAND, MAINE
BRODIE INDUSTRIAL TRUCKS, INC.
PORTLAND 5, OREGON
PRESTON FALLER COMPANY
ST. LOUIS 6, MISSOURI
MATERIALS HANDLING EQUIPMENT CORP.
SALT LAKE CITY, UTAH
ALBERT J. ISAACSEN COMPANY, INC.
SEATTLE, WASHINGTON
PRESTON FALLER COMPANY
SIOUX FALLS, SOUTH DAKOTA
CENTURY EQUIPMENT & SUPPLY
SOUTH BEND 14, INDIANA
MATERIALS HANDLING EQUIPMENT CORP.
SPOKANE, WASHINGTON
PRESTON FALLER COMPANY
SYRACUSE 2, NEW YORK
BRODIE INDUSTRIAL TRUCKS, INC.
TAMPA, FLORIDA
WHITMORE INDUSTRIAL TRUCKS
TOLEDO 4, OHIO
KERN TRUCK SALES, INC.
TORONTO 5, ONTARIO
J. H. RYDER MACHINERY CO., LTD.
TULSA 6, OKLAHOMA
ARST EQUIPMENT COMPANY
VANCOUVER, B. C.
NATIONAL MACHINERY COMPANY, LTD.
WASHINGTON 5, D.C.
CLARK EQUIPMENT COMPANY
WINDSOR, ONTARIO
J. H. RYDER MACHINERY CO., LTD.
WINNIPEG, MANITOBA
J. H. RYDER MACHINERY CO., LTD.

CLARK *features*



A CLUTCH YOU CAN CHANGE IN 80 MINUTES

LIFTING THE CLUTCH OUT OF POSITION

AT YOUR SERVICE

At the other end of your telephone is CLARK'S world-wide Service Organization ready to give you every needed help where you need it—when you need it. You'll find the Service Organization nearest you listed in your Classified Telephone Book under "Trucks, Industrial."

THE CLUTCH is far and away the most vulnerable part of a fork-lift truck. It takes the brutal strain, torture and wear each day of hundreds of stops, starts, "inching" maneuvers, shifts from forward to reverse and vice versa. In just one week of work it takes more punishment than your car's clutch takes in a year.

CLARK Engineering has produced a better clutch—a clutch that stands up longer under severe use than any other we know of in the fork-truck field. Yet even these superior clutches reach the point where replacement is an unavoidable necessity.

But here, too, CLARK Engineering has demonstrated its superiority by producing:

★ **a truck design which is unrivalled for simplicity, speed and economy in the removal and replacement of a worn clutch . . . a design in which clutch-replacement requires a mere 80 minutes . . . less than an hour and a half!**

This QUICK-CHANGE CLUTCH is just one of MANY good and important reasons why it pays to standardize on CLARK equipment for handling materials.

Fill in the coupon, attach it to your letterhead and mail it.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 12, MICHIGAN

☐ PLEASE HAVE REPRESENTATIVE CALL

Please send: ☐ CLUTCH DATA SHEETS ☐ MATERIAL HANDLING NEWS

Name_____

Firm Name_____

Address_____

City_____ Zone____ State_____

ALSO MFR'S OF CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

*DRILL LIFE INCREASED 300%

THE machine illustrated is turning out a socket part. When the manufacturer changed to a Texaco cutting coolant especially designed for this type of work, he immediately: 1) tripled his drill life; 2) reduced rejects; 3) eliminated staining; and 4) reduced lubrication expenses because the Texaco cutting fluid could be used as both coolant and machine lubricant.

This is a typical example of how Texaco Lubricants and Lubrication Engineering Service are helping plants in all types of industry, in all parts of the country, *increase production* and *reduce unit costs.*

Let a Texaco Lubrication Engineer assist you in making similar savings in *your* plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

*Name on request

TEXACO *in all 48 states*

LUBRICANTS, FUELS AND LUBRICATION ENGINEERING SERVICE

Faithfully yours 50 *for Fifty Years*

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

We're putting new emphasis on the

Human Factors in Maintenance Work...

...BECAUSE we think they've been sadly neglected in *many* plants—and underemphasized in *most* plants.

We aren't suggesting for one minute that maintenance productivity would zoom upward if plant managers and plant engineers simply looked for new ways to coddle their maintenance craftsmen—ways to inject them with laughing gas to make everybody happy.

We're talking about something much more serious than that—as you'll see when you look through the next 29 pages. We mean this:

A *real* job of maintenance is being blocked in a vast number of plants by mental attitudes that aren't geared to handle today's big maintenance problems. Attitudes of the uppermost management. Attitudes of the plant manager. Attitudes of the plant engineer or maintenance superintendent. Attitudes of the foremen and craftsmen.

...BECAUSE the maintenance function is much more important in the over-all plant operating picture than it was only a few years ago, such out-dated attitudes can cost big money.

Why is maintenance more important? The reason goes much deeper than the present pinch in replacement equipment—much deeper even than the high prices of equipment today. Here's the real reason:

The whole trend of production processes has been to take the skill away from the production operator and to put it into the machine. Naturally, this has made the machine more complicated. And it has made more essential than ever the job of keeping that machine in top running condition. That calls for maintenance as modern in know-how and equipment as the production machine itself.

Time was—and not too many years ago—that maintenance was something the plant people could do with their left hand. Any old time, with any old hand-me-down tools. Most plants didn't really have a maintenance department as such. Maybe some handymen and a few janitors. Maybe a foreman, and maybe not. Production people spent time on upkeep—whether anyone realized this or not.

A surprising—though dwindling—number of plants still run this way.

But even if the size of the maintenance force has grown, that alone doesn't guarantee a good maintenance job—nor an economical one.

Maintenance won't be done right until it's recognized as an important part of the production effort. It will limp along (wasting money) until the time and ingenuity—and investment of money—that have gone to improve production methods go into maintenance. Until the management skills and techniques that have raised the production worker's output are applied to maintenance as well.

...BECAUSE the human factors of the maintenance problem haven't had too much attention from industry, we may sound a bit "preachy" in this special report.

We don't mean to appear to be know-it-alls. What we have tried hard to do is to gather together the best thinking on this big subject—and to lay it on the line for you as practical ideas and advice.

Sometimes the advice may seem a little sketchy—not backed up by case examples. True regarding some of our points, not others. That's the price of pioneering. But we are convinced the basic ideas are sound. We hope you'll do some pioneering, and that FACTORY will be able to report your experiences over the coming years.

One thing we're sure of: None of the advice you'll read here is just theory. It's based on the practical experience of our department editors, who have had executive responsibility in facing all the problems we discuss, and of the many men in industry with whom they keep in close contact.

The men chiefly responsible for guiding this special presentation are:

Carl G. Wyder, our maintenance editor, who has been a plant engineer and a good, progressive one.

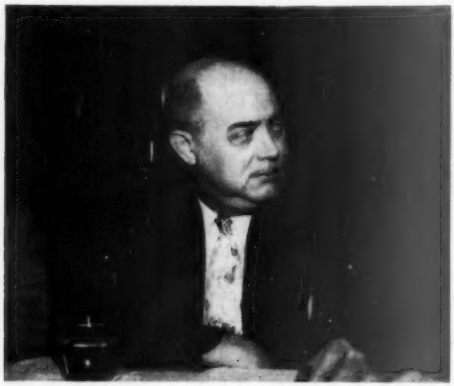
Joe St. Andre, our electrical editor, who is fresh out of industry, where he was an outstanding plant executive.

Backing them up were our other plant-wise editors, plus advisers from industry and labor ——→

GLENN GARDINER • Vice President, Forstmann Woolen Company, Passaic, N. J.

P. K. SHOEMAKER • Vice President, Manufacturing, H. J. Heinz Company, Pittsburgh

H. J. KNELL • Plant Engineering Manager, Wright Aeronautical Division, Curtiss-Wright Corporation, Wood-Ridge, N. J.



JOHN DUNIGAN • Supervisor of Maintenance, SKF Industries, Inc., Philadelphia

OUR PANEL OF EXPERT ADVISERS

ON

How to Boost the Maintenance Department's Productivity

FACTORY WENT TO INDUSTRY and labor for help with the toughest subjects in this special report.

We asked the men pictured here to tackle particularly the problems of:

1. The maintenance department's status and morale.
2. Union relations — a subject on which so many maintenance chiefs throw up their hands in despair.
3. Pay practices for maintenance men.
4. Proper supervision in the maintenance department.

These men met with us in our offices for a session that lasted long hours.

Many phases of the subjects the panel discussed with us are "hush-hush" in most plants—not talked about out loud because they're too

JOHN SILLIMAN • Assistant to Vice President, Manufacturing, American Type Founders, Inc., Elizabeth, N. J.

MAURICE OLCHOFF • Plant Engineer, Solar Aircraft Company, Des Moines, Iowa

H. CHARLES FORD • Regional Director, United Steelworkers of America, Philadelphia

CHARLES WIEDEMANN • International Representative, International Association of Machinists, New York.

"delicate." In many individual plants, that's probably a wise policy. But we think that maintenance performance generally will benefit from laying these subjects out on the table.

That's what we've done in this section. Not all plant executives —or all labor — will agree with everything we say. But we hope to stimulate the thinking of both.

A final word about the suggestions that follow: We want to make clear that they are not just a boiled-down version of the panel's discussion. They are suggestions from FACTORY's editors, drawn from their own plant experience and from their many sources of information among plant operating men — presented here with the advice and counsel of our panel members.

LOOK FOR THESE SECTIONS . . . .ON PAGE

1. Raise the Status of Maintenance to Lift the Department's Morale 70
2. Improve Union Relations to Cut Down Grievances 72
3. Adopt Pay Schedules to Fit the Job Demands 74
4. Develop Supervisors So They'll Know How to Supervise 76
5. Apply Job Standards to Measure Performance..... BY ROBERT S. RICE 78
6. Train Craftsmen in Basic Industrial Skills BY M. J. MURPHY 82

CASE STUDY: Maintenance Craftsmen Help Train Themselves..... BY HOWARD A. PILKEY 84

7. Improve Work-Planning and Administrative Controls.. BY GEORGE N. COLLINS 88

CASE STUDY: Two-Form Maintenance System Cuts Cost in Small Plant..... BY RICHARD E. NEUMAN 94

1. RAISE THE STATUS OF MAINTENANCE TO

1. GET RECOGNITION OF MAINTENANCE AT UPPER MANAGEMENT LEVEL.

Too few managements see that good maintenance pays off. They call it a "necessary evil." They treat it accordingly—as a fix-it crew with second-hand tools. And with a supervisor who becomes a whipping boy when he can't perform miracles in an emergency.

The fault lies with the front office.

But the remedy lies with the plant engineer or maintenance supervisor. He must "sell" top management. When you show the financial policy makers how fast money is going down the "poor maintenance" drain, you're hitting them where they live. That's when they begin to change their tune from "how little can we spend," to "how much should we spend?"

But don't be too quick to blame top management when it doesn't buy a plant engineer's proposal. Maybe he's at fault in the way he dished it up. More than once a $15,000 proposal has been dumped on a president's desk with a lot of blueprints and reams of engineering specifications.

A comprehensive one-page summary stressing savings is a more-than-fair bet to turn the tide.

Comments from the panel:

"It's the plant engineer's job to sell the importance of good maintenance to management. Show management the true costs."—SILLIMAN

"Be sure to present plant engineering projects properly. Not on the basis of 'We need this,' but Here's what you get for your money.' And pick the right time, too."—SHOEMAKER

2. GET PLANT ENGINEERS TO STOP ACTING LIKE ENGINEERS WHEN THEY HANDLE PEOPLE.

You can't "engineer" people by formulas. That's true whether you are dealing with people above you, next to you, or under you.

Here are some of the ways a plant engineer can improve human relations:

Study practical psychology and good management techniques. It isn't enough to be able to engineer an outstanding project. If a man can't get the approval of the front office and gain the cooperation of his department, he has failed.

Report on the activities of the maintenance department regularly. Not just a dry resumé. Dress up a fast-reading summary with some pictures and charts. Outline the major projects. Show how they will help other departments, what they will save. Send the report to production and industrial engineering supervisors as well as to the men in the maintenance department.

Talk with the personnel director. Get his help in the maintenance personnel problems and find out how the plant engineer can play a more active part in administration of company personnel policies in the maintenance department.

Comments from the panel:

"Engineers have to realize that a good administrator doesn't deal with immutable laws, but with varying human emotions."—GARDINER

"We get more mechanization every year. To get the most out of it, we'd better get more skillful about learning the human relations side. There's a great opportunity for improved productivity in this area."—SHOEMAKER

"Every one of 20 shop men I talked to in a certain plant told me he got criticized for what he failed to do—but none got a pat on the back for a good job. . . . If you keep a man happy, you have a far better worker."—WIEDEMANN

3. IMPROVE THE STATUS OF THE MAINTENANCE MAN.

The good maintenance worker is a skilled man. He may have served a long apprenticeship. He has acquired valuable know-how. And he studies to keep up with technical advances.

In many plants he doesn't seem to be appreciated. He's discouraged by poor or inadequate tools. He's frustrated by waiting and hunting around for spare parts. He loses heart and pride by low-grade shop facilities. He resents being blamed for all breakdowns.

His initiative is stifled. No one wants his ideas.

These normal reactions are no fault of his own. Of course he's inefficient!

Comments from the panel:

"Why should the craftsman be treated as a forgotten person, merely because he's not on the production line? Let him feel he's part of the team!"—WIEDEMANN

"We have divorced maintenance from our engineering setup. This relieves maintenance of the stigma of incompetence when complicated machinery needs attention—engineering has to decide what to do. . . . We also have divorced maintenance from housekeeping. We have found this has helped to build up the morale of our skilled man."—KNELL

4. PROVIDE TOOLS AND FACILITIES TO DO A GOOD MAINTENANCE JOB.

Some managements seem unwilling to provide adequate tools for maintenance—on the basis they don't help production. They're wrong.

Good tools are labor savers, cut the time and cost of repairs. The best craftsman is only as good as his tools.

Here are some tips on proper maintenance shops and facilities:

Measure maintenance shops by the same standards you establish for production—for light, heat, ventilation, cleanliness, sanitary facilities.

Give the plant engineer his own office where he can think, plan, and counsel with people. Give him good filing and drafting equipment.

Don't pass on obsolete and inefficient machine tools to the maintenance department.

You can mechanize many of your operations with floor-scrubbing machines, spray-painting equipment, percussion fastening tools, centralized lubrication, and the like.

There's a good chance you can use more materials handling equipment: powered fork trucks, hoists, cranes, delivery trucks. And roller conveyors, chutes, belt-loaders.

Are you taking advantage of all the latest portable tools? They let you cut repair time by doing the job on the machine, instead of hauling the machine to the shop.

Comments from the panel:

"Good office and shop arrangements are important."—OLCHOFF

"We believe in providing adequate, not antique, facilities for the maintenance department. This belief led recently to erection of a separate maintenance building."—KNELL

5. KEEP THE WORKER INFORMED OF MAINTENANCE ACTIVITIES.

Job insecurity is perhaps the greatest fear of the average maintenance worker. It's easy to see why. When expenses must be cut, management usually picks on maintenance. This on-again-off-again state of mind doesn't produce an efficient worker. The maintenance worker is no exception.

Here are some things you can do, as a plant engineer or maintenance superintendent:

Post a backlog of maintenance work. It lets the men know what's ahead. If there are plenty of projects planned, the men will be less afraid of "working themselves out of a job." If the work ahead is skimpy, the men can see that layoffs may be reasonable—not arbitrary. (For details on backlog charts, see page 92.)

Get out on the floor. Show a personal interest. Stop and inspect jobs. Talk with your men. It'll break down any idea you're in an ivory tower.

Let a man know where he stands. Don't let him think he's doing fine when he isn't—and then face him up with a record of poor performance. Merit rating is a particularly helpful way of letting your men know how they're doing.

Comments from the panel:

"Our preventive maintenance program helps stabilize employment. . . . I discuss problems weekly with my supervisors. You'd be surprised what you can do when you sit down and relax for an hour."—OLCHOFF

"We publish a backlog of our maintenance workload. Our men can see what's weeks ahead. . . . But you can easily get tied up in paperwork. Get out on the floor regularly and you'll spot lots of troubles before they occur."—KNELL

6. LISTEN TO YOUR MAINTENANCE MAN'S IDEAS.

Keep open the avenue of ideas from the men who are in the best position to discover them. Given a chance, a maintenance man should come up with more ideas than almost any other person in the plant.

He gets around to more places, sees more. He has to diagnose and analyze conditions on every job. So if his ideas are nil, something's wrong.

The best way to promote ideas is to adopt the good ones—fast. And be sure to praise the man who came up with the idea—and, if possible, reward him.

Even if the idea isn't too good, you can still gain by letting your craftsman air it. You can explain why the idea can't be adopted (but you'd better be right!). You'll forestall a disgruntled, hence inefficient, employee.

Some companies have had good success with a special suggestion system for maintenance.

Comment from the panel:

"Did you ever see a man so high in life he didn't crave recognition for his ideas?"—WIEDEMANN

2. IMPROVE UNION RELATIONS TO CUT DOWN

FACE UP TO "RESTRICTIONS."

Nobody likes restrictions. There's no doubt that union contracts impose restrictions on transfers, layoffs, work assignments, and overtime —to name just a few. All are problems. What to do about them? Here are a few things to think about:

The answer is to live under restrictions the best way you can—honestly and cooperatively, but with an eye to the future. As you go along, watch where they're causing you trouble. Make a record of these troubles. Put down your thoughts for improvements. Then you'll have ammunition for future contract negotiations. Facts count then; opinions don't.

Watch out that you don't abuse the "rights" that you do have. If you abuse them you're inviting more restrictions. Today, you *earn* the freedom of operation you want. You don't get it as a matter of course.

WORK FOR A BETTER LABOR AGREEMENT.

There are several things you can do to make a labor agreement fit your needs better.

You must first learn to live under a bad labor contract as well as possible until a chance comes along to improve it. Then you had better be ready with facts and figures to prove your case. "Impossible," you say? Of course not. Many plant engineers have lived pretty well under contracts that at first were thought to be "dogs."

Be straightforward in your dealings with the union and your men. It will turn out to be your greatest asset. Demonstrate to the union that you can be trusted to work out the terms of the contract that are troublesome—at the same time recognizing the conditions that led to the restrictions in the first place. Work to show the union people why a contract that hinders the successful operation of your maintenance department hurts *them* as well as you.

Make no "deals." They change the contract. Under-the-table transactions that slide around the terms of a contract are a sure invitation to trouble. One result you can confidently expect:

The more you make "deals," the harder you make the job of cleaning up a bad contract in the future. You also gain nothing but disrespect from union people. They may go right along with corner-cutting, because it's to their advantage, but they'll think less of you.

Get maintenance in on contract negotiations. You will be in a position to air the spots in the present contract that hurt the maintenance operations, and to recommend changes. You will also get first-hand ideas of the union's side in battling for certain restrictions. This may tip you off on how to handle grievances that may come up after the contract has been signed.

One sure result of sitting in on contract negotiations will be a much better understanding of the contract itself. You can use this information well in explaining the new contract to your supervisors. Then they won't have to learn the details of the new labor contract from the union steward when they are in the middle of a grievance.

DO WHAT YOU CAN TO CUT DOWN JURISDICTIONAL DISPUTES.

Let's not kid ourselves on this one. As long as there are crafts and craft unions, and outside contractors who work in your plant, you're going to have jurisdictional arguments. They'll be between the crafts, between craft unions and big industrial unions, or within the unions.

You may not be able to *solve* all these problems, but you can't give up. Suggestions:

Where an outside contractor is in your plant, clearly define where his men's work stops and your men's begins. Do it in advance, and see that everybody knows. This won't stop *every* dispute. But it will stop *most*.

Comment from the panel:

"Contractors' work must be of a constructive, new nature. We have a very rigid rule not to do maintenance work with any outsiders."

Make your outside contractor responsible for his men. There's temptation to move in and try to settle jurisdictional problems by dealing with the contractor's unions' business agents.

Comment from the panel:

"I've had less trouble when I made the contractor solely responsible than when I got in and meddled around with his business agents. The best antidote for jurisdictional trouble is to hire a reputable contractor who has an interest in doing a decent job."—KNELL

Don't take liberties with agreements made with outside contractors. For example: Production wants a machine hooked up over a week end. You've already defined that as part of the work of the contractor's men. But you hook the machine up with your own men anyway.

What happens? You've kicked off jurisdictional squabbling from then on between the outside men and yours. So—when you're tempt-

ed to change your rules, stop and think. *Then don't do it.*

Try to make craft thinking work to your advantage, if you have strongly craft-minded men working for you. Pride of craft is a real asset if you go along with your men, and show them you have some sympathy for the way they feel. You make trouble when you constantly buck craft thinking in what seems to be an unconstructive way—when, for example, you plan jobs so it looks as if you're trying to force the men to work across craft lines. Even confirmed craft-thinking workers routinely run across craft lines to a certain extent without question—as long as they don't feel they're being *forced* to.

Comment from the panel:

"I don't believe you should fight the trades or craft setup. I think you've got to absorb it and use it. I think you've got to have a system that keeps debate to a minimum."—KNELL

GET ALONG WITH UNION STEWARDS.

You can get a lot of help from your union stewards. And you don't have to let them run your department, either. It takes some doing, but ample experience has shown that it can be done, and is worth doing. Some things to keep in mind:

Don't be afraid to take the first step in trying to set up a good working relationship. You're management. It's up to *you* to set the tone. With some stewards, it's a long, hard job. With a few—a *very* few—it's impossible. But don't forget this simple fact:

You may not "like" a steward, and he may not "like" you. But you still *can* and *must* do business together. Believe it or not—you're paid to get along with stewards, not to fight them.

Remember that stewards are elected by your men. A steward is always partly a politician, and he has to please the voters. If you just keep this point in mind, you'll get along better with him—and get the results you want. Knowing the political problems, you'll not put the steward on the spot with his constituents. You'll play along and let him "save face" when he has pulled a boner. In other words, you'll do a lot of *little things* that don't matter to you, but are vitally important to him.

But—on the *big things*, the real issues, you'll hold firm, because you must. There's where your consideration on little things will pay off.

Never, never pull a "fast one" on a steward. It's the worst labor relations mistake you can make. He may not agree with you, but he must have 100% confidence in your honesty. Take that confidence away, and you'll be fighting endlessly.

Don't expect a steward to be a yes-man. He's not necessarily an asset to you or the union if he's just "easy to get along with." If he battles you on problems constructively, he can be a good man for everybody. If you can show him the wisdom of your decisions, maybe he'll go to bat for them with the men, too. There *are* stewards like that.

Keep stewards informed on changes that may affect the men. It's a good way to educate stewards on the problems *you* face. It also demonstrates your willingness to take the first step, and gives you a chance to size up possible reactions to future happenings.

Comment from the panel:

"Some years ago I instituted a meeting once a week with all the stewards in the department. We discuss problems quite frankly, and I learn a lot of very useful things."—OLCHOFF

SCHEDULE OVERTIME CAREFULLY.

Overtime assignments can cause a lot of trouble in maintenance departments. If you don't use good sense and scrupulous fairness in assigning overtime, you may end up with union demands for strict mathematical balancing of overtime among all men. Here are a few hints:

Try to keep your overtime within reasonable limits. Aside from the cost, consider the wear and tear on the men themselves. If you don't curb excessive overtime, the union may try to do it for you. Contract clauses limiting amount of overtime simply cut down further on the "rights to manage" that you have left.

Keep accurate records of overtime worked. They give you ammunition against complaints that you are giving all the overtime to a favored few. Of course, the records also enable you to check up on yourself, so you're sure you're in the clear if complaints come up.

Use overtime only for legitimate purposes. If you try to make up for alleged pay inequities by dishing out extra overtime, you're just asking for trouble next time the contract is negotiated. Even more important—you're encouraging your men to "dog it" on the job to "help" you to justify the overtime you hand out. And *that's* no solution to anything!

3. ADOPT PAY SCHEDULES THAT FIT THE JOB

With sound pay schedules, you're over one big obstacle in the way of higher maintenance productivity. Here are some practical steps you can take to set up the kinds of pay schedules you need.

1. KEEP MAINTENANCE RATES IN LINE WITH THOSE IN OTHER PLANTS IN YOUR COMMUNITY AND AREA.

Pay schedules are relative. And *good* pay schedules take account of what other plants are doing; they don't exist in a vacuum. Some things you can do:

Describe your jobs—in writing. Don't make a big "project" out of it. Just get down the key things the men in each classification have to do. Get your personnel department to help—if you have one. Personnel is a staff department set up to help you on just such projects.

Visit other plants and compare their maintenance rates with yours. See the right man *in person*, and be sure you check your job descriptions against his jobs. To compare rates, select only jobs that are really comparable.

Get the full story. Don't just ask for "average" rates. You want highest and lowest paid to each craft, too. And, to see the impact of overtime, you want total weekly earnings figures. With this information, you can line up rate comparisons that will give you a really good idea where you stand.

Decide where you ought to stand on maintenance rates. That's the next step, once you've found where you now stand. Are you just right? Too high? Too low? You can't decide on your own, probably. But you have the facts, and can take them, with recommendations, to the right people in the plant.

Is this old stuff to you? That's good. You're on the beam. And you can probably testify to the value of this kind of information when you have to negotiate with a union over maintenance wage rates.

2. KEEP MAINTENANCE RATES IN LINE WITH PRODUCTION RATES WITHIN THE COMPANY.

One of the big complaints you often hear is that production people are better paid, and don't work as hard. Is this really true or just an unfounded "gripe?" Here are things you can do:

Be sure of your facts first. Compare base rates of maintenance jobs with those paid for production jobs. Again look for high and low figures as well as average rates. You ought to see your top craftsmen right up near the top, FACTORY's panel of experts feels. Generally, that's where those jobs should be. But the precise relationship depends upon the levels of production skills required in *your* plant.

Take a look at incentive earnings for production workers. Here you're interested in total earnings. Here's where you're likely to find some real basis for complaints. Where there's an incentive plan, production workers' take-home pay may run 15% to 30% or more higher than the maintenance workers'. But if your production department doesn't have an incentive plan, you may be hearing complaints from production that maintenance rates are too high!

Consider maintenance incentives as a possible solution where production workers are on incentive. Impossible? Won't work for you? Tried it and had to throw it out? These are all common reactions when you mention incentives for maintenance. Perhaps they're sound in your case. But don't forget that many plants have put in real incentive plans, based on standard times required to do the work, and with earning potentials equal to those of production incentive plans. *These plans have worked.* You certainly can't dismiss this idea without serious checking. (For more on time standards for maintenance, see page 78.)

Comment from the panel:

"Where maintenance earnings are lower in comparsion to production earnings, I think it's advantageous to tie in maintenance workers with an incentive—a good, sound incentive."

Consider some form of group bonus for maintenance men. There *are* such plans. Some work; some don't. The trick is to adopt the plan that's best suited to your plant's job demands. It's tough to get the right plan, so don't be afraid to seek expert help inside or outside the plant. But group plans have their hazards, the panel warns. For example, flat bonus plans that loosely pay craftsmen the same percentage over base

rates that incentive production workers get are not good. Bonuses may be just pay raises without incentive for greater output.

Check overtime practices. That's because maintenance workers in most plants seem to get more overtime than production workers. If production in your plant is on incentive, you'll want to ask this pertinent question: Is the overtime legitimate—really needed—or is it "handed out" to give maintenance men a break?" In other words, is overtime being used as a disguised form of bonus? If your answer to this question is "yes" to any degree, stop and think. This is a corner-cutting practice that reduces maintenance productivity. Overtime is to be avoided in a good operation, not handed out as a reward.

3. SIZE UP HOW MAINTENANCE JOBS STAND IN RELATION TO ONE ANOTHER.

If you're paying some crafts a lot more than others, you want to have some pretty good reasons for the differences. As many plant engineers can report from sad experience, this is one kind of pay inequity that really makes trouble. Here are some suggestions:

What about wiping out all differentials in pay between the various crafts? Then all first-class men would get one rate (or rate range), all second-class men another, and so on. In theory, you'd wipe out complaints about pay inequities. And, in theory, you'd find the men more willing to cross craft lines in their work. It actually works in some plants.

Comment from the panel:

"As long as the pay of the special lines of skill is very nearly the same, the average steward is not too interested in whether or not the men work across craft lines. He's interested in everyone in the shop getting a fair rate of pay—and an even rate of pay."—GARDINER

Consider adopting a job evaluation plan, if you don't have one already. Job evaluation is the best and most defensible method that has yet been found to get jobs properly lined up in relation to one another for pay purposes. There are many good job evaluation plans to choose from—like the National Metal Trades Association plan. They're worth serious consideration if you're having in-plant "inequity troubles."

Consider setting up "combination jobs" that cut across craft lines if yours is a small plant. In many small plants something like this is practically a must. You find you can't afford to have a specialist in each craft, so you combine crafts. But watch your step when you undertake job combination. You'll want to be sure you define the jobs clearly, and assign them only to men who can meet the job requirements. Otherwise you'll run into endless argument over who does what. And you'll be paying low-skilled men the same as all-around men. That's just what you're trying to avoid.

4. DON'T KNOCK YOURSELF OUT TRYING TO MEET CONSTRUCTION INDUSTRY PAY RATES.

High construction rates are a problem. But if you try to meet them in your plant, you create more problems than you solve, with serious inequities between your jobs and other plant jobs. Some suggestions:

Have a good, factual sales story ready on the advantages of industrial work for craftsmen. You'll need it any time you bring in outside contractors to do construction work in the plant. The contractor's men will miss no chance to stir up your men with stories about high construction rates. You don't have to apologize for your rates. You actually have a good story. Just don't get caught without having it ready when you need it.

Try to keep your men and the contractor's as far apart as you can. There's no point in inviting trouble, so don't mix your maintenance crews with the contractor's construction crews, if you can possibly avoid it.

Try to get your contractor to take it easy on the overtime. That will help ease the sting of odious comparisons. In normal times this talk about overtime would sound silly. You'd stop it plenty fast. Now you may not be able to hold down overtime, or even want to. But it's smart to do it where you can. Economical, too.

Comment from the panel:

"The intrinsic value of the skill of outside craftsmen is no more than that of the regularly employed craftsman. The law of supply and demand has built up the wages of the outside craftsman because his is a far less desirable kind of life. Consequently we have built up an artificial value of the outside craftsman's skill."

4. DEVELOP SUPERVISORS SO THEY'LL KNOW

Supervision in maintenance work is tough. Craftsmen do their jobs in widely scattered places, so the foremen can't be watching them all the time. And the work is constantly varied, the problems the craftsmen face are forever new and perplexing. But . . .

For the very reason that it's difficult, supervision is tremendously important in boosting maintenance efficiency. Good supervision, that is. Here are some hints on how to get it in your plant.

CHOOSE YOUR FOREMEN CAREFULLY.

Good supervision starts with good selection. That is *your own responsibility*. Here are hints:

DON'T select your new foreman on the basis of seniority alone. But make sure you have a good reason for passing over men with more seniority. And make your reason clear to those men—and their union steward.

DON'T select your new foreman on the basis of craft skill alone. Know-how in his craft is, of course, a prerequisite, but it's not the most important skill he'll have to use as a foreman.

DO judge your foreman-prospect on his general mental alertness, his ability and willingness to learn. These are the qualities his new job will demand most.

DO take seriously into account the opinions of other supervisors—and even the union stewards—about the prospect.

TRAIN YOUR NEW FOREMAN *BEFORE* YOU MAKE HIM A SUPERVISOR. OF COURSE, YOU DON'T STOP THEN—BUT . . .

DON'T jump him quickly into a foreman's job until you're sure he has some skill in directing people.

DO make sure that his basic training includes guidance in how to sell to both the craftsmen and the upper management a program of what needs to be done.

Comment from the panel:

"A successful supervisor has the ability to sell, to get the other fellow to do something he wants him to do. . . . Why not bring in a salesman to give your foremen a lesson in dealing with people—how to make the right approach, and how to 'close the sale'?"—WIEDEMANN

BEWARE OF THE SUPERVISOR WHO THINKS HE HAS "ARRIVED" BECAUSE HE'S NOW A FOREMAN—AND FEELS HE HAS NOTHING MORE TO LEARN.

DON'T stop your foreman's training once you've made him a foreman. Keep impressing on him that he has to keep up to date, keep improving.

Comment from the panel:

"Too often the supervisor believes that because he's a supervisor he has 'arrived.' That he's a success and no longer a student. That he doesn't have to learn—he knows. He becomes less and less informed about what's going on that he should know about."—WIEDEMANN

DO make it attractive to your supervisors to keep "hep to what's going on, to learn better ways to do their jobs. There's no reason for them to keep learning if they feel they've reached the end of the line. Make sure there is some *realistic* and attainable goal ahead for them—promotion to higher management jobs, or better pay.

MAKE SURE YOUR FOREMEN ARE GOOD TEACHERS, GOOD EXPLAINERS.

DON'T expect your maintenance craftsmen to step up their performance unless your foremen explain the need, teach them what's at stake.

Comment from the panel:

"The high prices of new equipment today make it imperative that we get longer life from our

machinery. This demands that we get over to the maintenance workers better explanations of what they have to do, how they are to do it, and why they are to do it. It is the supervisor's job to provide that explanation."—SHOEMAKER

DO insist that the foremen become skillful in making clear—up and down the line—the needs of management for a quality job on time, and the needs of the maintenance crew for the proper facilities. Again, it's the business of good salesmanship that is needed in a good foreman.

Comment from the panel:

"If the supervisor cannot sell the job that has to be done—both to the men who work under him and to the management over him—then it's pretty near time to get new supervision."—DUNIGAN

BE SURE YOUR FOREMEN KNOW THE VALUE OF GIVING THEIR CRAFTSMEN RECOGNITION WHEN THEY DO A JOB WELL.

Criticism, for a job badly done is too often all the men get from the foreman.

DON'T set a bad example yourself by failing to compliment the supervisors for a good job.

DO encourage your foremen to inspire *quality* work, *ingenious* work, *fast* work by proper use of the pat on the back.

Comment from the panel:

"There shouldn't be any bosses among our supervisors. There should be leaders."—OLCHOFF

MAKE SURE YOUR FOREMEN SPEND MOST OF THEIR TIME AMONG THE MEN ON THE JOB.

DON'T expect the supervisor to be able to get out and supervise if he is nailed to his desk by routine paperwork.

DO provide him—or the maintenance department as a whole—with clerical help so that he runs the paperwork, and the paperwork doesn't run him.

DO expect foremen to know intimately the problems, the attitudes, the feelings of the craftsmen in their crews—so that they can correct misunderstandings, iron out gripes before they become grievances, interpret the ideas and aspirations of the men to upper management.

Comments from the panel:

"The plant engineer has to spend about 90% of his time in an administrative capacity. It's the supervisor under the plant engineer who actually is in contact with the craftsmen—who controls ultimate performance."—DUNIGAN

"The first requirement of a good supervisor is that he understand the basic problems of the men he supervises."—WIEDEMANN

IMPRESS ON YOUR FOREMEN THAT THEY MUST KEEP FAITH WITH THEIR MEN.

DON'T pressure your foremen to cut corners—for instance, on agreements they've made with the union or the craftsmen on who does what work. If you've authorized the foreman to make such agreements, stick by them.

DO operate through the foremen in your contacts with the craftsmen. That's the only way to give the foremen their proper management status.

DO correct a foreman if he makes a mistaken decision or takes an improper action—but do it in such a way that you don't undermine his authority for keeps. If the mistakes are too frequent, then get a foreman with a higher batting average.

PAY YOUR SUPERVISORS A FAIR DIFFERENTIAL OVER THE MEN THEY SUPERVISE.

DON'T expect the foremen to assume the responsibility you've given them if you don't make it financially worth while. Poor pay buys poor leaders.

DON'T let overtime premium pay for craftsmen knock an otherwise fair pay scale out of line. Make sure the foremen get overtime opportunities (and premium rates too)—even though the law doesn't require this.

DO review your supervisors' pay rates every time the hourly workers get a raise. Otherwise you'll wash out the incentive to be a good foreman.

5. APPLY JOB STANDARDS TO MEASURE JOB

You'll never know *how* good—or how inefficient—your maintenance department is until you try to find out. Sounds obvious? But few plants really try to find out—through time standards and work measurement.

That's one big reason why maintenance workers' productivity hasn't kept pace with gains in the production department's output per man-hour.

We think this article will show you it's practical to use time standards for maintenance work. Our production editor, who until recently was chief industrial engineer for U. S. Steel's Clairton (Pa.) Works, wrote it out of his many years of experience in industry.

BY ROBERT S. RICE
Industrial Production Editor, FACTORY

I've seen measurement of maintenance work with time standards. I know it can be done. And I know it will work.

What are the results? Units of work per maintenance man-hour climbed as much as 50%. The savings far outran the costs. It was unthinkable to return to the "by guess and b'gosh" days of wondering why some maintenance jobs cost so much—and of not being able to do anything about them.

There was a time when the production executive felt the same way about his production labor costs. Then along came the industrial engineer and showed him how to evaluate worker performance—by time standards. Oh yes, many died-in-the-wool production chiefs balked at those new-fangled ideas. They said this folderol wouldn't work, and would cost more than it was worth.

Production chiefs used to raise almost exactly the same objections a lot of maintenance chiefs are raising today.

If you don't set some reasonable rules of operation, a few dawdlers will block the production road. That's where time standards and work measurement come in. They spot the dawdlers for you, and pep up the fellows who are just a bit better than dawdlers.

Time standards don't mean speedup—they do mean "no parking" on a busy road.

What's even more important, time standards show management how to improve its own poor performance. They point up the need for better tools, better methods, better supervision—things that are exclusively management's job.

Production men now are sold on time standards. They no longer laugh off the benefits of work measurement. They've learned to accept its techniques as a lifesaver in keeping costs in line.

I can't say the same for maintenance. I seriously doubt that units of work per maintenance man-hour have gone up much, if any, in any plants that don't use *work measurement methods.*

Yet in these same plants I've heard executives complain: "If we could get a fair day's work out of our maintenance men, our cost performance would look a lot better!" They blame it all on the rank-and-file maintenance guy. Is this right? What can he do about it? He only works there.

Yes, I've also seen that maintenance workers don't always put on a top performance. Oh, sure—when you've got a critical breakdown they'll pitch in—voluntarily. After all, most maintenance men I've known do have pride. They'll give the "college try" to a job that has the attention of the brass. But don't expect every man to do it voluntarily on the less spectacular breakdowns, or on routine work. Some are lazy, yet smart enough to observe: "Who's going to know, or care?" They can become first-class gold brickers instead of first-class craftsmen.

Work measurement is bound to spotlight the drones.

The point is, when you put the heat on a job, set a goal. The maintenance man who knows his job can work as efficiently and effectively as a production worker. I've known him to break records on jobs that were planned—jobs for which detailed time goals were established for the parts of the job. But, just give some men a "loose" assignment—to run a pipeline, paint a roof, forge a gear blank, rebuild a motor—and the job will be loaded with lost motions, delays, and extras.

"But I can cut out that loafing and soldiering quick," you say. "All I need is plenty of good supervision, to watch the men more closely." Does it really work? Not if my long experience with production workers is worth anything.

Don't misunderstand me—good supervision has its place. But if supervision has no other yardstick to gage workers' performance than an elastic, mental, rule-of-thumb measure—each one different for each supervisor, mind you—you just can't be sure you're getting your money's worth.

I'm convinced there's only one way to gage worker performance: work measurement. Time standards will help boost performance beyond the point where even good supervision stops. They've proved themselves again and again in production work; they've raised worker performance from 25 to 100%; sometimes more. These results are facts, not opinions.

Why doesn't the maintenance department use this same tool to improve its efficiency? I get answers, the same old pattern of reasons, wherever I go. While they are honest answers, they are not good ones because they are based on opinions, not facts.

Let's analyze these reasons why maintenance superintendents object to setting up work measurement in their departments. Let's get the facts straight:

OBJECTION NO. 1: Management thinks we've already got enough maintenance overhead without adding more.

How you classify expense isn't so important as the total of your expense.

When you adopt work measurement you'll add about 3% to 7% of your payroll for application—as others have. That covers the men who apply standards and clerks.

But you can cut your maintenance force 10% to 50%—as others have. Also, better planning of work saves materials. Applied right, work measurement reduces total expense.

OBJECTION NO. 2: Why aren't simple ratio standards good enough?

Some plants use ratio standards for maintenance as well as other non-production work. I'm referring to the type of standard that allows you X number of maintenance man-hours per thousand production man-hours, or units of production.

Such "standards" are much better than nothing at all. They do provide a basis for controlled scheduling and over-all cost measurement.

But they have two big weaknesses:

1. They're usually based on historical records, and make allowances for existing inefficiencies. Arbitrary cutting of the standards to provide incentive for improvement creates more resentment than stimulus.

2. Ratio standards don't provide measurement of the individual jobs that make up the total man-hours. They don't tell you where you spent too much. They don't point out where you can improve methods.

OBJECTION NO. 3: The performance of *our* maintenance workers is high enough so standards would not be economical.

If you're right, you're lucky. But, to protect yourself, you'd better be certain.

I asked a number of consulting engineers who have studied a lot of maintenance work about their experience with unmeasured maintenance performance. They cite cases of 30% to 70% before application of standards. Most agree the average is probably around 50%. One cited what he called a "very unusual case" of 80%.

You can make a rough check of the performance in your plant. Get an accurate record of the man-hours spent on a few representative jobs with which you're familiar.

Let your experience guide you in estimating carefully how many man-hours the jobs should have required if properly planned and executed. That includes number of men, tools, materials, working procedure, and a 100% working pace. Divide your estimated man-hours by the actual man-hours to get the performance.

Observe such things as excess manning of jobs, time to move from one location to another, number of trips for tools and materials, the pace at which the men work. Combine these observations with your experience. Now, what's your honest opinion?

Call on your industrial engineering department to help you make an estimate of maintenance performance. If you don't have such service, or if it can't do the job, you can get a consultant to make such a survey.

OBJECTION NO. 4: Not many plants have tried maintenance work-measurement.

You're right—only a small percentage have. If that wasn't the case, I wouldn't have to argue for time standards in maintenance as I'm doing in this article.

But several companies have applied time standards to maintenance—successfully. They have improved

worker performance up to about 100%. Administrative costs—costs of maintaining, applying standards—range from about 3% to 7%. That's small, compared with the savings.

OBJECTION NO. 5: Many plants that have tried time standards have later abandoned them.

Sure, some have. Because they didn't start right. You've got to sell this program to *everybody* involved *before* you try to install it. The guys who have done it successfully observed these points:

1. The head man of maintenance must support the program wholeheartedly. If the boss takes a dim view, so will everyone else. The industrial engineer doesn't—and shouldn't—have the authority to force supervisors to accept the program and make it work.

2. Let the workers know what you're doing—and why. Suspicion begets trouble, may force abandonment.

3. Develop application by an orderly, planned program. No fire alarm tactics, please. Train the men who apply standards to do it right. Make sure the supervisors understand the application, and how to use it to help themselves. (See "How to Apply Time Standards" at the end of this article for more details on application.)

OBJECTION NO. 6: There's not enough repetitive work.

While it's generally true that there are fewer "repetitive" jobs in maintenance than in production, there are probably more than you think. It depends some on how far you've gone with preventive maintenance.

Lubrication, inspection, machine adjustments, parts replacements, many painting jobs, armature winding, many others definitely repeat. Some less frequently than others, but still they repeat. (Some more often than you'd like.)

While it's generally true that there are fewer "repetitive" jobs in maintenance than in production, there are probably more than you think. It depends some on how far you've gone with preventive maintenance.

Even though some jobs never, or seldom, repeat, the details—work elements, that is—of different jobs are so similar that most of the elements are more or less repetitive. For instance, one time you may have to tear down a machine to replace a broken shaft, another time to repair the clutch assembly. Though the jobs would appear different in the records, many elements of those jobs would be the same.

Likewise, the elements of pipe fitting, painting, welding, machining, wiring, and all the other trade and repair work will be found repetitive on job after job. Think of maintenance work in terms of parts of jobs, instead of the total.

Anyway, who says all production work is repetitive? I know plenty of operations where they make only one of a product at infrequent intervals—if they ever repeat. Manufacturers of packaging and other special machines, weldments, some instruments, pressure vessels, many fabrications make a lot of non-repetitive products. But you'll find most of them have time standards for the elements of those jobs. They build a job standard time from the element standards. They're measuring production performance. You can measure maintenance the same way.

OBJECTION NO 7: The work required to complete elements of maintenance jobs isn't always the same.

You say machines don't come apart as easily one time as they do another. Or that cleaning metal for painting fluctuates from very fast to very slow. That's right, you're bound to have some variable conditions.

But there are variables like those in production jobs, too. Jobs for which time standards have been developed. I know many such operations, some on which I developed the standards. For instance, flattening steel plates, up to about 20x30 inches. No two plates were alike with regard to the degree or location of the spots out of flat. But I set standards for the operation—worked pretty well, too.

Then there was a sheet salvaging operation: examining various shapes and sizes, with different types of damage and defects, classifying, and cutting apart to make the most and best marketable products. There were others as tough.

You can take care of some of these variable conditions by setting up standards to recognize the differences. In many cases, you'll have to do some averaging. But that's not as bad as it may sound. At least you'll have a standard for the "average" condition. You can find out whether the high and low performances are due to deviations from average conditions or something else.

I've found some of these wildly fluctuating conditions don't necessarily have to fluctuate so much. Take that flattening operation, for example. Before we time-studied it, time per piece varied several hundred percent. We found a lot of the variation was due to the methods used by different operators. By standardizing the method we eliminated most of the variation—cut it down to where we could strike a reasonable average.

OBJECTION NO. 8: It takes longer to figure standard time for some jobs than to do the work.

Sure, especially the first time on small jobs. **There are two ways to handle these small jobs that take too much checking:**

1. You can skip measuring them and concentrate on applying standards to the bigger jobs that use most of your man-hours.

2. If they're little jobs that repeat, take the time to set a job standard the first time. Then

you'll have it on file for fast application when it comes up again.

Incidentally, application costs should go down as you build a file of job standards from the work element standards. When the job repeats, pull the record from the file, make sure the details are the same, apply the time standard you calculated before. Even when there's a difference in part of the detail, you need only correct the total standard for the changes.

I've known application manpower requirements to drop two-thirds in about three years as a result of this accumulation of job records.

OBJECTION NO. 9: Are you trying to talk me into maintenance incentives? They're a headache—do more harm than good.

I won't buy that. They can be good. But I hadn't said anything about attaching a wage incentive to your time standards

All I've talked about is using the standards to measure the performance of maintenance workers.

You can use the performance reports to find out why you don't get better productivity—more units of effective work per man-hour. Some production departments use them the same way—without incentive.

Also, standards will help you find better methods, just as they have pointed out improvements in production methods.

They'll help you with your preventive maintenance program. And vice versa, better preventive maintenance simplifies the standards structure, helps make standards more accurate. That's because preventive measures tend to standardize work methods, avoid many breakdown jobs.

Although I believe incentives can be—and have been—applied successfully to maintenance work, I suggest caution. Before you rush from daywork to incentive payment of wages, study a realistic trial application of standards to determine your potential problems.

A few companies are applying time standards to maintenance work without using a wage incentive plan. Improvement in performance is not as high as in the plants that also use wage incentives, but enough to more than pay for the cost.

OBJECTION NO. 10: We've got enough to do without piling all that extra paperwork on supervision.

Start out with the idea that work measurement should help you—not make more work for you or your supervisors. Insist that the program be shaped toward that end. And it can be.

Let the industrial engineer develop the standards. But take time to review his standards, give him the benefit of your maintenance know-how. If he's the right kind of a guy, he'll welcome the help. It will give you the right setup to save your time patching mistakes later.

Let trained men apply the standards—under the industrial engineer's direction in the beginning. Later, one of your staff men can supervise them if you want to.

Let clerks prepare the reports and possibly graphs to interpret application. Insist that reports be reduced to the minimum amount of paper.

You and your foremen look at the reports to see how performances are going, where you should concentrate supervision.

HOW TO APPLY TIME STANDARDS

Let's not kid ourselves; applying time standards isn't simple. It's a big job to set time standards for all the elements of maintenance work.

In fact, after you have enough standards to start applying them, you will still be taking time studies for new jobs and methods.

Setting a standard is a combination of determining standard method and time for the element. You can spend a lot of time improving methods before you arrive at a time value. So much that you'll never finish the standards.

It's better to make only obvious changes immediately. Later you can change standards as you improve methods.

Start by setting standards for one group where you think you can do some good without running into stone walls. Develop enough standards for that group to cover the major portion of its work with reasonable accuracy.

Test the standards carefully by trial application. Work out the bugs and get complete understanding of application procedures. Give the engineer and yourself a chance to get the first application going right.

Then tackle the next group. Experience gained with the first group will speed development of standards for the others. Also, it will help meet the complex problems that may exist in another.

Develop time standards for all the elements of the work. For instance, to measure painting, you'll need time standards for: move to job, set up scaffold, clean surface, paint surface, and others. There will be many standards for painting a unit area to recognize differences in surfaces, paints, location, and other factors.

A *job* standard is the result of applying and adding the element time standards for all the elements of a job.

It's ideal to calculate and post job standards ahead of doing the job. That gives the men a goal to shoot at. But it isn't always possible, because the extent of some jobs isn't known until you're into them.

Give as much information ahead of the job as you can. It has been my experience that a standard figured after the job's completed is not nearly so effective.

6. TRAIN CRAFTSMEN IN BASIC INDUSTRIAL

By M. J. MURPHY • Industrial Relations Editor, FACTORY

1. WHAT KIND OF MAINTENANCE CRAFTSMEN DO YOU WANT?

This sounds like a silly question. It isn't, though. You have to be pretty sure of the kind of man you *want* in your organization before you can make much progress in training the men you *have*.

The point is this: If you put all your emphasis on basic *manual* craft skill, chances are you'll be setting your training sights way too low. You can find many a helper with all the manual skills pretty highly developed. But they're still helpers.

Here's the kind of man you should want:

1. **He must have the basic manual skills** of his craft, of course. That's the necessary "starter."
2. **He must have basic "safety skills," too.** Maintenance men too often have the reputation of being the least safety-conscious workers in industry. There's no valid reason for this charge to be leveled at *your* maintenance men. It's your responsibility, as an operating executive, to see that the craftsman is *trained* to be safe.
3. **He must have "craft judgment."** That's one of the magic ingredients of skill that a craftsman has. Ability to cut, thread, and install pipe, for example, is *manual* skill. Judgment tells the craftsman the *kind* of pipe to select, the *hazardous spots* where that pipe must take detours, the *economical* and practical numbers of joints to use. That's what makes a real journeyman pipe fitter a big asset.
4. **He must be skilled at communicating technical information.** You don't hear much about this point, usually. But lack of it may be a big reason for high maintenance costs. Here are some examples of what "maintenance communication" means in practice:

   Your man must be able to sketch accurately, in line with drafting conventions. Sketches are the craftsman's shorthand. Not knowing the simple fact that dotted lines aren't the same as solid lines in a sketch can cost thousands of dollars in scrap. That's just what happened in one case recently where a replacement part was sketched wrong.

   Your man must know the language of the shop—names of tools, machines, parts, metals, and materials. He can waste a full hour sending people looking for "S wrenches" in a shop where they're known as "crescent wrenches"—that recently happened in one plant.

   Your man must know the systems and procedures of the plant, and its operating processes. If he doesn't, he's going to get you in trouble—on paper work, or on damaging interruptions to production.
5. **He must be flexible.** Your good craftsman must be a "broad-gage" worker. Despite the trend toward specialization, many maintenance jobs require knowledge of several crafts. Your man needs broad craft knowledge to do his own job right. The electrician, for example, who doesn't know anything about the millwright's part of a motor line-up job can waste the millwright's time and the company's money.

2. WHAT TRAINING CAN YOU DO READILY?

INDUCTION TRAINING • Few people will argue the importance of careful induction of newly hired workers of lesser skills. But it's not uncommon to overlook this important in-step for maintenance craftsmen. To do so is a serious mistake.

An experienced craftsman can be expected to know his trade. But what does he know about your plant? If he's from the construction industry, in fact, he probably knows little about *any* plant, and has even more to learn.

What about your production processes, your layout, and all the systems and procedures? How about safety rules and equipment? What about names and characteristics of tools, equipment, and materials commonly used in the plant? Does the new man know how to read your prints—and can he sketch so that others in your plant know what he means?

Every one of these questions suggests a topic for induction training. Nothing elaborate is needed to do this kind of training. Even the smallest plant can get good results with one man at a time. Size of plant isn't important.

Think you don't have the time to fool around with organization induction training? Admittedly, nobody *ever* has time for all the jobs in a busy maintenance operation. But here's one case where *making* the time is sure to save you many hours later on. You get two big returns out of breaking in every new man properly:

1. You're surer of *keeping* the man.
2. You won't have to spend so much time correcting the new man's mistakes.

APPRENTICE TRAINING • Most companies argue that they're in trouble *now*, and can't afford to wait

four years for an apprentice to be trained.

Of course not—if you have no apprentice training program in operation. You have to look elsewhere. But what were you doing four years ago? Were you saying the same thing *then*?

As those who have tried it know, apprentice training is surprisingly easy. Records are simple, and there are numerous state and federal apprentice training experts who can give all kinds of help.

As for small plants, there is always the feeling that "apprentices are only for the big fellows." That's not so in practice.

One of the fine things about apprentice training is that you can actually run a program with ease for just one or two boys. We described a good example only a short time ago ("Apprentice Training in Small Plants Is Easy."—FACTORY October 1950, page 104-105).

HELPER TRAINING · Are you one of those who frowns on the helper system? If so, you've got lots of company among plant engineers these days. But let's assume that, like most other plants, you still *have* helpers.

What can you do to make best use of the helpers?

Properly used, the helper system can really *help* you. You can use the system almost as a substitute for apprentice training. Improperly used, the helper system may give you little more than a group of high-priced, semi-skilled laborers and tool chasers.

One thing is certain:

You don't have to be a training "expert" to do a good maintenance training job. You can get ample help, in and out of your company, that will make your job easier. If *you* offer interest and strong desire to see that training gets done, the help you can get will pay off.

The first thing you can do, certainly, is recognize that the helper system can be a valuable asset to you—if you work to make it pay off. Here are some suggestions:

1. Pick your new helpers carefully. Try to get men who are interested in becoming craftsmen in time—and who are capable of doing so.

2. Break helpers in on the job with care. Use good judgment in picking the men to whom you assign new helpers. Your aim should be to pick the *good teachers* among your craftsmen. Some companies give their key craftsmen Job Instruction Training ("JIT") to make sure they do the best possible job with new helpers.

3. Give helpers variety of experience. Move them from one man to another—and from one craft to another. But be careful to have a plan. Try to move them from simpler to harder assignments. And give them a chance to learn for a few months at least before shifting them at all.

4. Encourage helpers to study the related information they will need for their jobs. They all should have basic shop mathematics, blueprint reading (with sketching practice), and some training in using and reading standard measuring tools. Special subjects are also increasingly important these days—like electronics for electricians, and strength of materials and elementary metallurgy for millwrights and maintenance machinists. You don't have to teach (or offer) such courses. But you can help your men to find them.

3. WHERE CAN YOU GET HELP?

Here are some of the main sources of help:

1. Staff help inside your own company. This is especially valuable in bigger companies that have personnel, maybe training departments.

2. Help from manufacturers of equipment. The manufacturers of equipment often welcome the chance to help you train employees in how to use and maintain their products. Often, too, the manufacturers have their own schools to which you can send one or more key men, or they will train one of your men right in the factory.

3. Help from school authorities. Public and vocational school officials are generally cooperative. At little or no cost to you and your employees you may be able to work out unusually complete training programs.

4. Help from apprentice training officials—state and federal. They can help you set up training, both on the job and in school classes.

5. Help from your own employees. As at Carborundum (see article on the next page), you may find your own craftsmen are among your best sources of training help. They can literally train themselves, if given the chance and some help.

This isn't the whole story by any means. Maintenance training is a big, important field. But what has been said should be enough to make one point pretty clearly. It's this:

There are literally dozens of ways in which you can work training into your departmental program—to give you the all-around craftsmen you need. You don't have to be fancy about it, either.

6. TRAIN CRAFTSMEN IN BASIC INDUSTRIAL SKILLS

... Begins on page 82

CASE STUDY...

By getting everyone concerned—craftsmen, management, equipment suppliers, and the training department—to participate fully, The Carborundum Company came up with a whale of a good training program. Participation guarantees the men get what they want—and need.

By HOWARD A. PILKEY
Manager of Administrative
and Factory Training Work
The Carborundum Company, Niagara Falls, N. Y.

MAINTENANCE IS ALWAYS A TOUGH JOB. But we think it's extra tough at The Carborundum Company. We make all kinds of abrasive grains, bonded abrasives, and coated abrasives. Despite modern blowers and suction devices, hard, sharp abrasive materials get into the machines—and the machines take a beating.

Bearings, materials handling elevators, crushers, belts, sheaves, gears, etc., all work in this abrasive atmosphere. Bearings that would last a lifetime under normal conditions, last only weeks in our plant. Maintenance of equipment and facilities becomes a major item in the over-all picture.

The maintenance department at our plant —like all other plants—is made up of just plain people. And unless these people know all there is to know about their job, and do that job well, maintenance won't be done right. And what is done would be costly.

Only by assisting our mechanics to do a better job could we hope to reduce our maintenance costs.

We saw the need to help our maintenance craftsmen learn everything there is to know about their job and how to do that job better. Our first step was a training program for millwrights. I'm going to tell you just about that part of the over-all training program. But what we did for millwrights, you can do for any maintenance craft in your plant. A similar program for pipe fitters, carpenters, electricians—based on their specific needs—will get you similar results.

TWO MILLWRIGHTS SHOW THE FOREMAN how they'd pull a gear from a turbine. The real point is that other millwrights are learning good practice, too. Foreman Bill Ruffner is at right, rear.

"OUR MILLWRIGHTS NEEDED TO BE BROUGHT UP TO DATE ... "

During the years of World War II, keeping machinery running and equipment in shape put a big burden on the maintenance department. Production had been boosted to a new high. We couldn't get enough new machines or replacement parts. Worst of all, we couldn't get maintenance mechanics—particularly millwrights.

During the 1930's, our industry had less need for this particular craft. Many who were already millwrights transferred to other fields. New tools, new machines, new methods of doing things in the '40's made the skill they had more or less obsolete when they tried to get back into millwrights' work.

The result was that many of our millwrights, although good mechanics, were only able to do part of a millwright's work. They needed some help if they were to be able to do a full-fledged millwright's job, as was called for at Carborundum.

Craftsmen Help Train Themselves

MILLWRIGHTS LEARN FROM VENDOR how to disassemble component parts of a speed reducer worm gear, while other millwrights learn the proper method of disassembly of the speed reducer. The vendor here (center, wearing vest) is Joe Marlan, manager of sales for the W. A. Jones Foundry & Machine Company, Chicago. Joe and other vendors did a lot to make the training program a success.

After the end of the war, our maintenance department was reorganized on an area repair basis. This meant that each millwright would be required to do all the work in his area. He could no longer be a specialist in one phase of the work.

Jim McCullough, our general foreman, and Bill Ruffner, foreman, both in charge of area repair, thought some practical training was one of the first things we should take on. This training would include full information on new developments, equipment, and techniques and would make these men, now limited in their range, good, all-round mechanics.

Late in 1948 this idea was discussed with the trai[illegible] partment. Maintenance asked what kind of pro[illegible] could be set up. We were all agreed on one point: The course had to be practical. We would be working with men who installed and maintained equipment. It was their job to keep that machinery running. They were not responsible for the design or selection of equipment.

It was also evident that the men didn't want lectures. Instead of talking about how to do something, why not show them how—with machines and equipment in the shop? We knew that every man has some special skill. Why not use the combined skills available in the group? Let the men participate in the course—and participate fully.

The training course, to be successful, should be a place where the men could discuss problems as a group—exchange ideas and ask questions about problems that they encountered every day.

"... SO WE SET UP A TRAINING PROGRAM."

It was decided to hold a series of meetings with a small group of millwrights—not more than 20 in a group. A variety of topics would be discussed. Frankly, we had no fixed program at first. We sort of felt our way into the course—played by ear.

Later I'll show you that the idea of flexibility in such a course was a big asset.

This is the training program we set up:

1. Supervisors from the area repair would be the leaders. They would be supplemented, where necessary, by specialists from the various vendors who supplied us with tools and equipment. One point was made clear to the specialists: They were not to be salesmen.

2. Displays of tools and equipment and demonstrations on how they should be used would be set up. Especially the newer tools and equipment. The new gun-type tool for "shooting" studs into concrete and steel, new-type belt fasteners, hydraulic tools, were some of the items that we knew our men were interested in.

3. Machinery, parts and equipment such as speed reducers, bearings, pillow blocks, couplings, sheaves, etc., would be actually dismantled and maintained. Procedural techniques for their assembly, installation, care, and maintenance would be discussed while the men worked on them.

Before we had used movies, slides, and charts to explain this to them. But this time we thought they should just be supplementary to the practical work the men would do.

4. An outline of the material to be covered during the meetings would be prepared in advance. Due to the variety of work with which millwrights are concerned, the selection of what to cover was a real problem. Certain areas needed more emphasis than others. "Which subjects are needed? How much time for each? What order should subjects be in?" These were questions we asked ourselves many times.

We wanted to cover all phases of the millwright's job. We had a lot of men to train. The courses would be conducted on company time. But we couldn't cripple the maintenance function by taking men off their regular job for too long a period at a time.

We finally decided on one 2-hour meeting a week for 25 weeks. A few men would be taken from each area.

"WE WANTED COMPLETE PARTICIPATION."

Planning the program was one thing. Putting it into practice was another. Before the final plans were completed, we were well into 1949. But we wanted to get results which could be the basis for our future courses. Time, therefore, wasn't too important a factor.

We felt that to insure success we wanted complete participation by four groups. They were: management, millwrights, vendors, and the company training department. Let's see how these groups participated.

Management • It participated first by approving the course; second, by permitting it to be held during working hours.

But its participation was active as well as passive. Each session was introduced by the works manager, Mr. Albertson. Mr. Reitz, works engineer, and Mr. Stube, assistant works engineer, also took part in several meetings.

Paul Brown, division manager, also talked to the group and discussed some of the problems of management. Bill Ehlers, director of industrial relations, talked to the group at the last meeting in a give-and-take session on the part millwrights have in the over-all production picture.

Thus the men in the course had a demonstration that management considered the millwrights and the course important, and also that maintenance had a big problem within the plant.

Millwrights • They participated in demonstrations and contributed their practical know-how. The problem was the thing. Consciousness of management-employee relationship disappeared. "The answer, the answer, who's got the answer" was the game. Before the course was over, millwrights were holding their own with the "experts" and showing them a thing or two. And the "experts" recognized the millwrights' experience.

Result? That indefinable thing—friendly enthusiasm to do a better job—together.

Vendors • They didn't have to be convinced they should participate. We got aid from Frank Clement and Joe Heiman from our purchasing department in getting specialists from the outside. The companies were very receptive to the idea.

We found the companies were very selective as to whom they sent. "We have just the man for you in our home office," one company said. The fact that the home office was hundreds of miles away didn't seem to make any difference to them. Another company sent us specialists from all over the country. One company was represented by its president. Vice presidents, sales managers, and service managers represented other companies.

All the talks that these vendors gave were right up our alley, as far as the millwrights were concerned. One of the specialists told us later that he was sure he got more out of the course than he gave. When you add up the years of experience represented by the group attending the course and realize that most of that time has probably been spent handling the product the specialist was demonstrating, it isn't hard to see how the specialists got a lot of information.

Training Department • Our part was minimized. Men do better when they help themselves. We worked with the maintenance department in setting up the course, preparing the materials and demonstrations—mostly advisory. We just double-checked to see that everybody was doing his job. We worked with the purchasing department in contacting vendors—and clarifying in the ven-

dor's mind just what we were after. We didn't "instruct" anybody. We got others together—and found that the facts weren't in any one man, but were in *all* of them. In give-and-take around a real machine they found the answers—and found them together.

It would have been easy to let the training department handle the instruction. But we would have lost the angle of participation by supervisors and employees. It would have become just another training course with questionable results.

Our first group started in the fall of 1949. It was a pilot group composed of all assistant foremen, group leaders, and a few top millwright mechanics. This pilot group laid the groundwork for the groups that followed. We've just started our fourth group.

The first group found plenty to talk about. Two hours just weren't enough to cover the various subjects. For instance, tools took three sessions; we had scheduled it for one. It might seem unnecessary to talk care and use of tools and equipment. But when a display board of tools is stretched 50 feet along the side of the room, you see how many tools the millwright must know about.

Again let me emphasize the need for flexibility. Different groups have different interests. You are not dealing with school boys, but with men who need a little more knowledge about certain things in order to help them do a better job. A successful course cannot be "canned" in any phase. If you want the men to take part in the course, it must be about the things that they are interested in and can tell other men about.

"THE RESPONSE WAS MOST GRATIFYING."

Did we get results from our course? The response of the men was most gratifying. Many of the men approached their supervisors later and expressed their thanks for the way the information was given them. Held on company time, the employees were made to feel that the two hours a week spent in the conference room were not just two hours off with pay. Rather, they were two hours the company invested in the millwright so he might learn to do his job better.

Of greater importance was the restoration of pride in the millwright himself. For once, he heard from "top brass" that he amounted to something in the over-all production scheme and that management was willing to invest time, money, and effort to help him improve himself. He was able to demonstrate to his boss and his fellow millwrights the skill which he had accumulated over the years. Instead of being told how to do things, he was now able to tell others how *he* thought it should be done and learn ways of doing it better.

Naturally, at first the men were a little reluctant to take part in the demonstrations. "Just another trick to get me to show how little I know" was probably in the minds of many of the men at the start. But they soon found out that their advice was not only wanted but that the success of the course depended upon everybody contributing his experience and know-how.

They found out that the specialists who built the equipment and supplied the tools they used didn't know all the answers. For many of the outside vendors, this was the first chance they'd had to really meet and talk to the man on the job. Previously, their contacts had been with engineers, supervisors, purchasing agents. Now they could get the real dope from the man who kept the equipment running.

Another good result of the course was better relations between the men and their supervisors. And suprevisors got to know their men better, too. As the course progressed, many hidden talents came out. Men gained mutual respect for each other's knowledge. They saw each other during demonstrations, shared their knowledge.

The men learned that their bosses were fellows just like themselves. The boss didn't know all the answers. But he wanted to learn them. He was willing to learn the answers from the men under him. The course proved how much all members of the maintenance department—craftsmen and supervisors—depended upon one another. They found they could solve practically any problem when they pooled their information.

The over-all results of the course have been very good. Two of the men who took the first course have been promoted to supervisor. Maintenance craftsmen are already looking forward to the next course—a more advanced one than they've had.

And our equipment is in much better shape. There's less downtime for repairs now. Bearings last longer, belts don't wear out so quickly, sheaves stay in better condition. Why? They're installed correctly and serviced properly.

To get results in your maintenance training course, get everybody into the act—management, training department, outside specialists, and the craftsmen all participating to improve the know-how of the department. Above all, by restoring pride in workmanship in your mechanics, by getting them to want to do a better job, you'll improve the efficiency of the department.

Collect all the skills and make them all available to everyone in the particular craft and you'll have a better maintenance department.

IF YOU WANT DETAILS . . .

We have prepared some mimeographed copies of the complete millwright training program mentioned here. If you'd like one, free, write: The Editor, FACTORY, 330 W. 42nd St., New York 36, N. Y.

7 · IMPROVE WORK-PLANNING AND

HOW TO BOOST THE MAINTENANCE DEPARTMENT'S PRODUCTIVITY

Nothing you do to improve maintenance productivity will really pay off unless your over-all management of the department is efficient.

No matter what the size of your plant, this will involve some paperwork. If your mind—or your boss's—is set against that, lay aside your prejudices for a few minutes and read this advice.

By **GEORGE N. COLLINS**, Senior Staff Engineer
Wallace Clark & Company, Inc., New York

A SYSTEM OF SIMPLE AND DIRECT paperwork controls is the keystone of an efficient maintenance organization. Why? The best way to support my belief is to tell you about the seven controls I'm talking about, and why they are so necessary. Then judge for yourself.

1. WORK ORDERS

"No job without a work order number," is the first rule in my book. Here's why. The work order provides a medium for the maintenance executive to know, in any desired detail, what work is required, when it is wanted, and what the costs will be. By its use he can authorize and control the execution of the work.

"Put all the orders in writing," is my second rule. Do it after you start the job if an emergency keeps you from doing it before. To save on clerical costs, too many plants allow a big part of maintenance work to be done upon the oral request of operating foremen.

When records are inadequate, the maintenance executive is left in the dark. He has no way of knowing the backlog of work in the department. He has no means for scheduling work. Work priority is given to the jobs wanted by that foreman who shouts longest and loudest, but whose actual need may be the least. Work gets done that should not have been done at all. Work might have been done differently, if only it had been viewed with relation to the over-all needs of the entire plant.

There's more that's bad. Misunderstandings will occur between maintenance and operating personnel as to whether orders were ever given, and what was wanted. Jobs are done incorrectly and at inopportune times. Jobs may be orally assigned to craftsmen by supervisors. That results in mistakes, delays, and lost time.

TO ILLUSTRATE · I know one small company that operated on an oral basis. It had a total of 12 maintenance men. All orders were oral.

The maintenance foreman tried to keep a list in his pocket of the phone orders he received. On completion of jobs, craftsmen had to find the foreman to learn what job to do next. The foreman was always hard to find. So the craftsmen returned to their shop, sat down, smoked, talked, and otherwise killed time until the foreman returned.

Needless to say, morale throughout the plant became bad. The craftsmen were bored and had little respect for the management. The operating foremen who needed to have work done were continuously irritated by seeing the loafing going on in the maintenance shop. They would try to give orders to the idle craftsmen, but the craftsmen had been told to take no orders except from the maintenance foreman.

When craftsmen refused to take orders from others, they got into open conflict with the operating foremen. If craftsmen tried to be decent,

they got bawled out by their own foreman. He also carried the fight to the operating foremen who had "stepped out of line."

Then came the change to a simple work order system. These difficulties vanished. The company was able to reduce the staff of 12 craftsmen to eight. The four surplus mechanics were transferred into the die department and became die makers. The morale of the entire plant improved.

2. PLANNING & SCHEDULING PROCEDURES

There are many good reasons why all maintenance work should be planned and scheduled. You get work done in the sequence that will cause the least amount of interference with production and machine downtime.

This means manufacturing schedules can be met for customer satisfaction. You get the greatest economy of use of available maintenance man-hours. Because work orders are estimated, you find it relatively simple to distribute the available maintenance manpower to jobs in priority sequence.

When the work of the craftsmen is planned a day ahead, they are able to work with speed and confidence, and with a minimum amount of delay between jobs. They are able to plan their own work and have the tools and supplies for each job.

Morale goes up, because maintenance men know what is expected of them, and when. Maintenance foremen are free to concentrate on the technical aspects of the work, producing quality jobs. Operating foremen know when to expect their work to be done. Good planning and scheduling minimize confusion, misunderstanding, high-pressure tactics, and delays.

TO ILLUSTRATE · I can recall a plant of some size where, although it used a good work order system, it made no attempt to estimate the time requirements of jobs, or to line up the jobs to be done a day in advance. The maintenance foreman took about an hour each morning to thumb through his order file and assign the day's work to the 50 men in the force.

Thus 50 valuable man-hours were lost each morning before the men could get started. Even then, men couldn't start or finish some of the jobs assigned them—they lacked materials or spare parts, for which advance planning had not been made. All for lack of planning!

3. EQUIPMENT RECORDS

Don't overlook the value of equipment records to a well-ordered maintenance department. These are records which catalog machine descriptions, special characteristics, locations for units or groups of all plant equipment. They should include lists of spare parts, lubrication and inspection intervals, together with accumulated maintenance history and costs.

All these data are important. Questions continually arise in both financial and operating ends of an organization as to what equipment it has, its cost, purchase date, and so on.

The availability of this information at one central point is essential. Without it, lubrication and inspections would proceed on a haphazard basis, if at all. Also, there would be much opportunity for buck-passing. With it, confusion is eliminated and employee morale is of the best. Employees know that management has recognized their problem and met it.

EFFECT ON COSTS · Equipment records that accumulate maintenance costs against each piece of equipment provide management with a strong tool to tell when repair costs are excessive. Time after time in making maintenance surveys I have had craftsmen say this to me:

"Why doesn't management do something about some of our equipment? We keep repairing the same machines over and over again. Why, I bet we've done enough to some of the machines in the last year to pay for new ones, or to pay for a real repair job several times over. It sure does seem foolish to us to spend any more on some of this equipment."

The answer is that management just doesn't know about these maintenance costs, or it *would* do something about them. If management will insist on keeping good equipment records, it *will* know these things. And it will be able to follow up with intelligent action, and obtain benefits such as these:

1. Save money uselessly spent on repetitive repairs.
2. Save production time on machines that give constant trouble.
3. Save operators' wages paid for idle time during emergency repairs.
4. Improve maintenance department morale by recognizing and correcting major sources of trouble.
5. Improve morale of production operators by allowing them to work without interruption.
6. Improve product quality by providing equipment adequate to perform the required operations within established tolerances.
7. Improve morale of the production control

department by permitting schedules to be met without interruption for emergency repair.

8. Improve customer relations through the ability to produce and ship on schedule.

4. PREVENTIVE MAINTENANCE SYSTEM

Good preventive maintenance depends on faithful adherence to adequate inspection and lubrication schedules. It's not hard to get. In addition to recording basic information on the periodic lubrications and inspections in the equipment record, you must also set up the same schedules in a calendar or tickler file. Thus, each week the equipment requiring attention for that week will automatically be "called up" and assigned to those responsible for performing the work.

It's not much use to establish the schedules unless there is an automatic means like this to insure performance.

5. LOAD CHARTS

With proper work orders, plus reliable methods of work measurement, you can estimate jobs more easily. And you can schedule them with reasonable accuracy for tentative starting or completion dates.

An easy way of doing this is to summarize the estimated hours required for each craft, and express the totals graphicaly on charts. These charts, called load charts, will show the total working load for each craft (1) for each week, and (2) for the future.

This backlog information is important because it enables management to size the work force to the work load. It points up peak-load conditions. Management can intelligently decide whether to plan for (a) overtime, (2) additional shifts, (c) additional staff, or (d) force reduction.

Without this knowledge of the work load for future weeks, management has no way of knowing, except by the pressure of current work, whether its maintenance department is over- or under-staffed.

TO ILLUSTRATE · I have seen in many plants a marked tendency for management to resist additions to the maintenance staff until the pressure of emergency work forces expansion. At this late point the bars are lifted, and the emphasis then becomes: "Fix everything at any cost."

Men are hired in numbers without any knowledge of the actual work load. Often the momentum of the maintenance drive carries staff additions beyond the bounds of reason.

That's not the end of it. Having solved the problem by hiring, management then forgets all about increased labor costs until business slacks off. Often the load on the maintenance department tapers off before anyone in management thinks about it.

You can understand the reluctance of maintenance foremen, after having finally obtained adequate staffs, to reduce their staffs if the work load decreases. They argue with themselves that it's only a temporary lull. So they "spread the work" while they wait and see. What else would you expect?

This practice results in higher costs than necessary. By the time management catches up with the situation, many dollars have been wasted. If and when it does catch up and starts to swing the axe, again it uses pressure methods—this time in a too hasty retreat. It stops far below the point for good maintenance because it has no factual data regarding work loads.

Load charts would indicate when and how far to plan man-hour cut-backs as well as warn of the need for increased manpower. In my opinion, this method has no substitute!

WHAT SIZE FORCE? · I know of one plant that used to "size" its maintenance force by the rule that expenditures required for maintenance are directly proportional to the volume of business being done. Based on business expectancy for the following year, management would compute its budget and allow an arbitrary lump sum for maintenance for the year. This was "it." This budget was set without regard to the existing maintenance load, which was not known.

Obviously this is an unrealistic way to determine how much your maintenance costs should be. Maintenance manpower requirements are to some extent related to gross volume, but certainly not directly proportional.

There is for every plant a certain minimum force below which serious plant deterioration will result. In the plant in question, this arbitrary method resulted in very low foremanship morale. The foreman received his orders and obeyed them. At times he was under-staffed, and other times he was over-staffed.

The foreman and superintendent didn't know their fluctuating load. Therefore they couldn't show management why their promises could not be made and kept when under-staffed, or why their costs were high when over-staffed. Confusion twice compounded was the result.

In another plant, management set the maintenance budget as a percentage of factory payroll. The percentage figure used was the average experience of several of its competitors. Investigation showed that the items thrown into maintenance expense by the competitors varied widely, and that there was no correlation. Management here was trying to fit a square peg into a round hole.

NO GUESSWORK · There is an easy way to size the work force and to keep it in tune with the times. You simply express all work in terms of orders, and you estimate these orders in craft man-hours. Then you add up the man-hours for each craft in the weeks when the work is wanted, and chart them so that the exact conditions are graphically apparent.

In this way you can intelligently appraise the whole situation. This method of charting the work load invariably results in:

1. Properly sized total work force, which is properly balanced in craft skills.
2. Ability to "switch" or interchange work to meet fluctuating demand.
3. Ability to give promise dates for completion of maintenance jobs, and to meet the promises.
4. Good supervisory morale, because you use logic and objective analyses to size the work force, assign overtime, and shift the work. You don't have to resort to arbitrary decision, apathy, or erratic correlation.
5. Good worker morale, because work-load charts completed sufficiently far in advance allows supervision to plan and "even out" the peaks and valleys in manpower needs. You can forecast employment changes and give fair notice to employees. You can plan steadier work, and time for training and upgrading. All these features lead to more contented employees.

6. CONTROL OF MAINTENANCE STORES

Even in this day of rising labor and material costs I am surprised to find how the problem of maintenance stores is still neglected. I find stockrooms being supervised by pensioners long past their point of usefulness.

I find areas assigned to stores in the least accessible and out of the way places—far removed from the maintenance men who require prompt service. I find materials scattered throughout these areas without bin tags or identification, and with wanton disregard for order and space utilization. I find inadequate racks and 19th century hand-trucks.

I find stores squeezed onto overloaded floors, while there's unused space just outside the congested area. I often find no records of materials in storage, or if records are available, I find that any similarity between records and items is mostly coincidental. I find stockrooms unlocked and accessible for anyone to help himself.

Small wonder indeed that the managements of such plants find their maintenance is a mess. Small wonder maintenance craftsmen waste as much time in hunting fruitlessly for materials required as they apply time productively to using them.

WHAT'S NEEDED? • Modern, adequate maintenance stores require the following:

1. Central location.
2. Competent, active supervision.
3. Access only by authorized personnel.
4. Modern storage equipment and layout.
5. Modern handling equipment.
6. Adequate receiving and disbursing records.
7. Perpetual inventory records that signal re-order points.
8. Control of re-order quantities to meet changing conditions of usage and frequency of replacement.

If these tools are provided to maintenance stores, they will pay off in:

1. Lowered capital inventory investment.
2. Reduced maintenance man-hours.
3. Fewer and shorter production shutdowns.
4. Elimination of confusion.
5. Better space utilization.

7. EXECUTIVE REPORTS

To be of value a report must express operating facts in such a way that the executive knows at a glance when to act, and what to do.

Here are a number of periodic spot reports that can be of real value to the maintenance executive and top management:

1. Per cent of planned versus emergency work hours.
2. Maintenance load (future load by weeks for each craft).
3. Equipment downtime.
4. Progress of major constructions and installations.
5. Maintenance overtime.
6. Inventory of (a) actual versus budget amount, and (b) inventory turnover.
7. Ratio of maintenance costs to production costs.

I believe in graphic reports—you can chart every one of these. Charts like these can help you make quick and reliable decisions that will sustain high maintenance efficiency and keep this department on the beam.

DO YOU WANT TO KNOW...

. . . how to put these ideas into action? FACTORY still has reprints available in its Plant Operation Library series of these comprehensive articles on maintenance work planning and administrative controls.

No. 139 — A Plant Manager's Program for Maintenance Control

No. 137 — How to Build a Maintenance Program Now to Fit the National Emergency

No. 129 — Keep Your Plant Up — Keep Your Costs Down

No. 113 — Principles of Maintenance

No. 112 — The Management of Maintenance

You may purchase these, as long as the supply lasts, at 35 cents per copy. Clip out this notice, check the reprints you want, and send with check or money order to: Editor, FACTORY, 330 W. 42nd St., New York 36, N. Y.

7. IMPROVE WORK-PLANNING AND ADMINISTRATIVE CONTROLS

...Begins on page 88

CASE STUDY...

...Two-Form Maintenance

Many moderate-sized plants shy away from maintenance control systems because the maintenance boss — or the plant manager — thinks he can't afford the time and money involved.

But here's a 350-man plant that's now convinced it can't afford *not* to have an adequate paperwork system. An engineer tells how they got that way, how they benefit — and how the system works.

By RICHARD E. NEUMAN, Industrial Engineer, S. Goldberg & Co., Inc., Hackensack, N. J.

WE DON'T LIKE PAPERWORK any more than anyone else does. But if you think a good maintenance paperwork system isn't worth while in a small plant, take a look at us. Our system takes only one clerk for an hour a day. But we wouldn't give it up even if it cost much more to operate.

We average only eight men in our maintenance force. They report to a maintenance foreman, who in turn reports to the plant superintendent. And he's directly under the president.

In plant size, we're small potatoes—only 350 employees. In our own industry—soft-sole slippers—we are the world's largest manufacturer. Our total floor area runs around 90,000 square feet.

When our president OK'd the idea of our maintenance paperwork system, he gave us some advice: "Keep it simple. You know how people hate paperwork. To make it work, you've got to convince them there's no red tape in it."

But we didn't sacrifice effectiveness for simplicity. Our two-form system does for us all the things good control ought to do in any well-run plant. It's the basis for authorizing all maintenance work and estimating job costs. It's used to plan and schedule the work. It serves as a record for accumulating cost data. And it tells top management how the jobs are progressing and how maintenance costs are running. We've got control of maintenance from start to finish.

Let me show you a bit of what I mean. There's a report book on the president's desk that tells him quickly the status of our operations. Among the pages of graphs and charts that summarize all the plant operating facts he needs for good control are five pages on maintenance. Here's what's on them:

Page 1—bar charts that show the monthly and so-far-this-year costs of labor for building maintenance, plus comparison with a year ago.

Page 2—the same for building material.

Pages 3 and 4—the same for labor and material on machine maintenance.

Page 5—Summary of all four charts.

These management reports are made by our time study engineer. But the facts on maintenance that go into the report come from our two-form paperwork system.

WHAT OUR NEW MAINTENANCE SYSTEM IS DOING FOR US

Maintenance is now considered on a par with all other production departments. It gets the same management consideration and treatment. It has to work with equal efficiency. Whether or not it does is no longer guesswork—the records will tell.

Control. We now have fingertip control of all maintenance work—and this, of course, includes costs. We can control the order in which rush jobs are done, so that the most important one gets done first.

Efficiency. We have improved the efficiency of our maintenance men by better planning and scheduling of work. Because all major jobs are estimated, our maintenance men have a target to shoot at which helps them meet a "standard." On repetitive types of jobs we can check the performance against previous cost data. This growing file of cost data also is very helpful in deciding whether we want to tackle a job again ourselves or let it out to a contractor.

Costs. We know in advance approximately how much each big job will cost. We have an organized flow of work orders that ties into the plant cost accounting system. Each day our plant superintendent gets a report on **all** maintenance work done the previous day. This report also shows the accumulated time of each job to that date, date started, and date completed.

These reports are later summarized into the bar charts on the president's control sheets that I told you about. If his charts signal the need for more details, we can tell him exactly where the labor time is going and why material costs went out of line. In fact, major variances are noted in contrasting color right on the bar charts themselves to anticipate this proper management curiosity.

HOW WE INSTALLED OUR NEW MAINTENANCE SYSTEM

We started by selling the idea at the top. Then we had to sell it to department heads and key men who would use the new system. This involved, first of all, the design of a system with a minimum of paperwork and a maximum of sensible control. We started from scratch. Many of the elements of our system were taken from systems in other plants described by FACTORY.

Next step was the preparation of a tentative standard procedure for maintenance paperwork. Our policy is to issue standard procedures in all our administrative functions in the plant—our maintenance was not going to be an exception. The proposed procedure was circulated to all key men to get their slant on it. It came back with excellent suggestions for revision. These were adopted, and the standard procedure was approved by management and issued in July, 1950.

Since then two minor revisions have come out, and a third is soon to follow. This procedure, as all others, is reviewed every six months. Key men are invited to suggest advisable changes. In all these revisions there has been no change in the basic operation of the two-form system.

HOW OUR TWO-FORM MAINTENANCE SYSTEM WORKS

We have wrapped up a lot of checks and balances in our system. It takes seven pages in our standard procedure manual to explain to our own people how it operates. If this sounds discouraging, remember that maintenance is a complex operation at best. You can't allow any gaps, no matter how small, in the accounting of labor or you lose the desired control. Materials normally do not require such strict accounting. So you have to be specific about both rules and exceptions, to keep the right score on worker performance and material costs. When people understand the *how* and *why* of paperwork routine, they will cooperate better, and cut mistakes that make records unreliable.

Best way to describe how our system operates is to show you how it takes care of the four basic phases or functions of a good maintenance program. But first you should get acquainted with the maintenance work order form on pages 94 and 95. It's an 8½x11 white index card, perforated across the middle width. The form on the lower half is duplicated on the obverse of the upper half, so when the form is folded, the two forms are in register, and the lower half becomes the carbon copy. Thus you can get a duplicate of the order at one writing. This type of form is inexpensive, too.

Let's see how this form is used . . .

1. TO AUTHORIZE WORK. Rule. When a production supervisor or the maintenance foreman wants a maintenance job done—repair or new work—he fills the top part of the maintenance work order form, in duplicate. He gets signed approval of the plant superintendent, who keeps the duplicate for follow-up, by date. The original goes into a special "out" box for frequent pickup by the maintenance foreman.

All work involving permanent changes in the plant, no matter how small (capital expense) must be approved by the president. He must also approve *all* jobs costing over $100 in labor and material, whether done by the maintenance department or an outside contractor. If the superintendent doubts the need for any job, the president makes the final decision.

The superintendent asks the maintenance foreman to enter the cost estimate on the work order whenever he needs it for proper approval. Or, when he wants to check with an outside contractor whom he thinks can do the job cheaper. Of course, we include overhead for such comparison.

Exceptions. Supervisors may ask maintenance workers orally to do two kinds of jobs: (1) minor and (2) emergency. But a worker can accept such a job only if the foreman has given him blanket permission to do that type of work. For example, we want electrical work done only by a qualified man—he does a better, safer, and faster job.

(1) *Minor jobs, 15 minutes or less.* Purpose is to relieve the production department of unnecessary red tape. But even then, if the job needs materials the worker doesn't have in his tool box, he must telephone his foreman for a go-ahead. Often it is more practical for the foreman to send

MAINTENANCE WORK ORDER

JOB LOCATION: CUTTING ROOM

JOB DESCRIPTION: MAKE UP NEW TAKE-UP FIXTURE PER ATTACHED SKETCH

TO BE ENTERED BY MAINTENANCE DEPARTMENT FOREMAN

ESTIMATED COST: MATERIAL NONE REQUIRED HOURS

MATERIAL ORDERED: BY DATE

TO BE ENTERED BY OFFICE

ACTUAL COST: MATERIAL 10.94 HOURS 12.2 LABOR COST 20.28

OK: MAINTENANCE DEPARTMENT FOREMAN O.K.

MAINTENANCE WORK ORDER COST SUMMARY

MATERIAL DESCRIPTION	QUAN.	PRICE	AMOUNT
5/8 Pillow block	2	3.45 ea	6.90
1½" ✕ iron	5'	$.12/'	.60
18 ga. galv. sheet	50'	.32	1.60
⅞" drill rod	2'	.61'	1.32
MATERIAL COST			10.42
MATERIAL ALLOWANCE	5%		.52
TOTAL MATERIAL COST			10.94

LABOR WORKER NO.	HRS.	RATE	TOTAL
402	6.2	1.65	9.90
404	6.2	1.73	10.38
TOTAL LABOR COST	12.2		20.28
OVERHEAD			10.14
TOTAL COST			41.36

CARD NO.	DATE		HOURS	CLOCK RECORD
404	1/6	OUT		TU 17.0
		IN	4.0	TU 13.0
402	1/6	OUT		TU 17.0
		IN	4.0	TU 13.0
404	1/7	OUT		W 10.0
		IN	2.0	W 8.0
402	1/7	OUT		W 10.0
		IN	2.0	W 8.0
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN	12.2	

BACK AND FRONT OF WORK ORDER (LEFT AND ABOVE)

the material by the next man going out on a regular job, instead of having the minor-job man come all the way back to the tool crib.

A worker always notifies the foreman, upon returning to the crib, of all minor jobs completed, so that he can record the time. If the job took over 15 minutes, the foreman writes out a confirming work order, which then goes through the usual approval channels. If less than 15 minutes, the foreman also writes out a confirming order, but it needs no approvals. You have to do this if you want reliable maintenance cost breakdowns. It takes us half a minute to write each work order, but the benefits are worth it!

We insist every minute of a worker's time be accounted for. We used to throw all minor work into a group of three standing orders: building maintenance, machine maintenance, and indirect labor. But we had to discard this simplification because there was a tendency to throw all miscellaneous jobs into these groups, and so lose control.

Material costs are not kept on minor jobs. They are too small—a bolt here, a screw there, are typical of most cases. Should a minor order involve big material expense—this is rare—the foreman makes out a confirming work order which goes the usual round of approvals.

(2) *Emergency jobs.* A worker may make repairs without a formal order when production is interrupted or equipment fails. Or, to eliminate a personal or plant accident hazard. He always notifies the foreman, who may want to see the job. The foreman prepares a confirming order later.

NO. 3454

REQUESTED BY SUPERVISOR: Lee

APPROVED BY SUPERINTENDENT: [signature]

DATE ISSUED 11/5/51

DATE WANTED – CHECK ONE	
ROUTINE SCHEDULE	☑
RUSH ☐ EMERGENCY	☐
OTHER (SPECIFY DATE)	☐
CONFIRMATION WORK ORDER	☐

DATE STARTED 11/6

DATE COMPLETED 11/7

LABOR COST _____ TOTAL COST _____

DATE RECEIVED _____

TOTAL COST $41.36

PLANT SUPERINTENDENT [signature]

DAILY MAINTENANCE SUMMARY

START	CONT.	DATE START	COMP.	WORK ORDER #	DATE 11-7-51	PREV.	400	401	402	403	404	405	406	407	408	409	TOTAL
				ROU-TINE	SUPERVISING		8										
				"	CLEANING SHOP + PUTTING AWAY TOOLS	100%				8							101%
				"	REPAIR LIGHTS	92%											
✓			✓	"	REPAIR MARKING MACHINES	15%		3									18%
	✓	11/6	✓	3454	MAKE TAKE-UP FIXTURE	8%			2		2						12%
	✓	11/6		3459	REPAIR CLUTCH, LINE 2	1%					2						3%
	✓	11/6		3460	CLOSE ROOF PORTS	16%							8	8			32%
1	3	2			41 HRS. TOTALS		8	3	2	8	4		8	8			

PROVIDE DATA FOR DAILY SUMMARY (RIGHT). THAT'S ALL THE PAPERWORK THERE IS IN THIS SIMPLE CONTROL SYSTEM.

Special routine jobs. Some of our maintenance work is highly repetitive and can be controlled by specific standing orders that cut down paperwork without loss of control. We have 10 such orders under functional names that explain themselves, such as: supervision, clean shop and put tools away, repair lights, repair racks, or repair marking machine. You can add as many more as you need for routine preventive maintenance functions, such as inspection, lubrication, or cleaning machinery.

Labor costs are accumulated by setting up separate work orders for each of the 10 headings. The orders are kept in a rack in the maintenance office. Whenever a worker puts time on such a routine job he punches time out and in, and enters his card number and date. You can keep a running record by the day, week, or longer, as you wish. Materials used on these orders are handled in the same way as for minor jobs.

2. TO PLAN AND SCHEDULE WORK. Late every afternoon the maintenance foreman plans the work for the next day, so that he can assign it first thing in the morning. He reviews all the work orders on hand, and lines up the jobs for each worker in the order of importance.

We have an open-tier cabinet on one wall of the maintenance office for work assignments. It measures 10 tiers across, and about eight tiers deep. Tiers are large enough to hold a group of work orders. Each worker has his own vertical set of tiers marked at the top with his card number. The horizontal rows are marked to show the status of orders in each tier, such as "Working On," "Emergency," "Rush," or "Regular." A few extra tiers hold unscheduled orders held "Waiting for Weather," "Waiting for Materials on Order," and for similar reasons.

The foreman assigns work orders by putting them into the proper tier. If more than one order belongs in one tier, they are arranged in the order of importance from the top down. Thus the foreman can tell at a quick glance what's cooking. And so can the worker. It's a self-dispatching system. The worker can automatically pick up his next order without hunting up the foreman.

We are considering an improvement, by adding several vertical tiers labelled "Electrical," "Carpentry," and so on. The reason is this: Some of our workers are skilled in several crafts. If there is a rush electrical job, we can put it in the proposed "Electrical" tier instead of just one man's "Rush" tier. The first electrical worker to finish his job picks the order up. He couldn't do this if that order were in another man's tier.

3. TO GET LABOR AND MATERIAL COSTS.

Labor. When a worker starts or completes a job, he punches in or out on the back of the work order. The foreman has already marked the worker's card number and date started. If two or more men work on one job, they all punch time on the one card. On completion of job, the worker enters the date completed, and turns the card in to the foreman. If a worker is interrupted on a job, it's up to him to notify the foreman to enter the

time. Adjustments for time on a minor job that was sandwiched in during a work order automatically get made when charging that time, as already described.

Material. Each worker reports to the foreman what materials he uses. We do not use stock requisitions. Our small department does not justify a full-time stockroom attendant. The foreman is responsible for ordering and supervising care of the supplies and repair parts.

The foreman lists all materials used on the back of any work order where the material cost exceeds $5, or where an estimate has been made. We had to draw the line somewhere. A figure lower than $5 would mean more paperwork. That amount, we decided, gave us satisfactory control of materials. It might have to be lower or higher for another plant—you have to test it against experience.

Why don't we ask the workers to list materials used? Several good reasons: (1) the foreman can do the pencil pushing more easily; (2) we couldn't read the craftsmen's writing; and (3) when the foreman does it, we get standardization of terminology that facilitates pricing. A worker might call a piece of lumber "shelving" when it actually is a 1x6 roofer, or he might put down "hinge" when it should be a "1x4 butt hinge."

Reason No. 3 is the most important.

The foreman realizes these careful distinctions in terminology. From his copies of purchase orders he knows what description to use. He often knows the purchase price. When he does, he lists the price on the work order. If not, he lists the supplier, so that the office clerk who calculates the cost of each order can find the unit price in office purchase files. Minor items such as nuts, screws, and welding rods are estimated by the foreman in a lump sum.

4. TO DEVELOP THE MANAGEMENT CONTROL REPORT. Our plant superintendent knows what's going on in maintenance every day. No more waiting until the end of the year to study the bill. He sees each completed report. And he gets a capsule view from the second part of our two-form paperwork system. It's called a "Daily Maintenance Summary" (see page 95).

This form is printed on standard 8½x13 cap-size paper. It summarizes all maintenance work done each day. Columns on the left show the status of each order worked on—and whether started, continued, or completed that day. In the center we list all standing orders, and all orders worked on that day. The columns on the right show total hours previously worked for each job listed, hours each man put in that day (by card numbers 400-409), and total hours. The total time of all maintenance workers must reconcile with their pay clock cards.

How Summary Is Made and Routed. As soon as the maintenance foreman assigns work each morning, he sends all work orders worked on the previous day—complete or incomplete—to the cost clerk. She immediately lists these orders and time details on the summary report.

The clerk returns the *incompleted* orders to the foreman as soon as possible. Should a maintenance worker need to time-stamp a card in the interim, he can stamp a note paper for posting later.

When the cost clerk has readied the daily summary, she quickly routes it to:

(*a*) *Plant superintendent.* For approval. He removes from his follow-up file all active work-order duplicates that the summary shows are completed, and discards them.

(*b*) *Timekeeper.* For posting completed jobs on a plant operations report (of all departments) that he sends daily to the president. This report also shows number of maintenance jobs completed that day, and the daily average for each preceding 12 weeks (3 months). This comparison has proved to be a good trend indicator on maintenance performance, despite the variations in time for each job.

(*c*) *Payroll Clerk.* For preparation of the maintenance payroll distribution needed by the cost accounting department. There's no guesswork here!

HOW PERFORMANCE ON EACH WORK ORDER IS CHECKED

Now let's see what happens to the daily batch of *completed* work orders. The cost clerk extends all labor at actual rates, regular and overtime, and totalizes labor costs. On materials she gets unit prices from purchase files (if not already entered by the foreman), and computes this total. A fixed overhead rate, determined elsewhere, is applied percentagewise to the labor cost. Total cost is the sum of all three.

The clerk sends all completed orders, showing actual costs, to the plant superintendent for review and approval. He, in turn, sends all unusual work orders (over $100) to the president. Both executives can see, in black and white, how close the actual cost met the estimated cost.

The completed work order is finally routed to a permanent office file. Here it is filed by order number. Also, a cross-reference card is kept by subject. For example, a card labelled "Steam Boxes" will show, by date and order number, all work orders of that kind. Such a historical file has proved valuable, particularly in estimating future maintenance costs.

TO SUM UP: Before we had this system we knew maintenance was expensive, but never knew why. Now that we have this "watchdog" we know what to expect each job to cost, and what each job actually did cost. We can spot the big spenders, and do something about them. We really have control.

HOW TO HELP BRITAIN ...and Ourselves

The purpose of this editorial is to help Winston Churchill obtain the aid Britain needs

(1) to weather her present financial crisis, and

(2) to avoid a chronic recurrence of such crises.

This is not a philanthropic purpose.

Britain is our staunchest ally in the free world's continuing fight for survival. She cannot perform her role effectively if she is broke, or if she careens from one financial crisis to another.

Then, too, a nation such as ours—committed to private enterprise as a way of economic life—has a special interest in helping Winston Churchill to help Britain. His administration is relatively friendly toward private enterprise. Should he fail, he would be replaced promptly by a Socialist government more hostile than ever. And that would weaken the standing of private enterprise in the free world.

Cause of the Crisis

It is the drive of the Western World under our leadership to rearm against Russian aggression that has precipitated Britain's financial crisis. It set off a scramble for raw materials from which armaments could be made, and for many other materials that might be short in the event of war. So the prices of the things that Britain must import—mostly raw materials—have been boosted more than the prices of things she can export—mostly finished products. That leaves Britain short of funds to pay for essential imports. This difficulty increases as the necessity becomes more urgent to divert industrial effort from production for export to production for security.

The Basic Trouble

Although Britain's immediate crisis was touched off by the rearmament drive of the Western World, her basic affliction is one from which she has suffered since the end of World War II. Stated in its simplest terms, Britain does not produce enough goods to pay her own way as one of the family of free nations.

For years this deficiency in home production was made up by income from shipping and overseas investment. But Britain had to sell a large part of her foreign investments to finance her heroic part in World War II. So her income from that source has been greatly reduced. And, in spite of an increase of about a third above prewar in her own production of goods and—thanks to a continued "austerity" program—a much larger increase in her exports, Britain still is not paying her own way.

Two Ways to Solvency

Britain has two ways to restore her solvency. One is to cut down on what is consumed—the belt-tightening process. The other is to step up British production.

To surmount the present crisis, Mr. Churchill has asked for some cutting down. He probably must ask for more.

Except as a stop-gap expedient, however, more cutting down of Britain's consumption is clearly a dangerous course. That would further depress a British standard of living which, not more than half as high as ours, already is too low. Politically such a course would grease the skids for Winston Churchill's administration, even now governing by a wafer-thin parliamentary margin. Also, as *The* (London) *Economist* remarks, the "lazy expedient of cutting trade" would result in "hurting other people and forcing them to take similar action"—by cutting the market for their products.

The Only Cure

The best and, in fact, the only way to help cure Britain's economic ills is to help Britain produce more. Here the technical possibilities are encouraging. On the average, the British industrial worker produces only about 40 percent as much a year as the American worker. That is a British estimate, made by Sir Ewart Smith.

Wider use of better industrial methods and modern tools and an infusion of the competitive incentive into British industry — to replace the cartel and other restrictive practices — would go a long way to narrow this wide gap in worker productivity. This is the consensus of experts on both sides of the Atlantic.

Since 1948 the Anglo-American Council on Productivity has done much to encourage output per man-hour in Britain and to foster this doctrine with both labor and management. But much yet remains to be done.

In the United States it is increasingly suggested that before we give Britain any more economic aid we should insist that everything possible be done to exploit the technical possibilities of increased production. This emphasis on production is needed. But if we Americans were to impose upon the hard-pressed British people conditions that could be construed as an affront to a friendly and sovereign nation, we might well put into the hands of a masterful rabble-rouser such as Aneurin Bevan, the anti-American leader of the Labor Party's left wing, a campaign issue on which to maneuver himself into the Prime Ministership.

Churchill Can Insist

But Winston Churchill is not so handicapped as we should be in imposing prerequisites of further aid. As Britain's own, most honored leader he will raise no touchy questions as to Anglo-American relations if he insists that Britain have firm plans to cure her economic ills, plans sharply focussed on ways and means of increasing Britain's industrial efficiency.

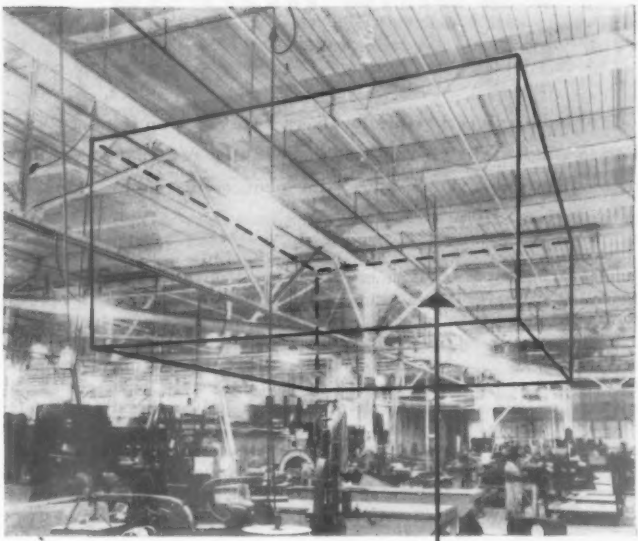
By presenting a convincing plan to cure Britain's recurring crises through greater production, Mr. Churchill will greatly facilitate the process of getting the aid his country must have. He will also remove an increasingly dangerous element of dissension in Anglo-American relations—the feeling of many Americans that more aid to Britain is more money down the drain. The way to counter that feeling is to come up with a prescription for an economic cure, not a request for another economic poultice.

Technically, such a program is entirely feasible. It will perhaps be the supreme test of Winston Churchill's statesmanship to make it politically feasible as well.

In the interest of Britain, of the United States and of the whole free world, we wish him all success.

McGraw-Hill Publishing Company, Inc.

If You Need Space at Low Cost...



THEY'VE MADE 49,300 square feet of work space at Boeing Airplane Company's Seattle plant without a nickel's worth of lateral expansion. They hung balconies over production areas — six of them.

Over the area at the left, Boeing hung a 34,000-sq.ft. balcony to house the tool engineering department.

Also housed in balconies now are: stationery stores, stores and reclamation, production blueprints, physical research, and industrial engineering departments.

...Look Overhead and Maybe You'll Find a Balcony Is Your Answer

Balconies can be of varying sizes. At Boeing, they range from 1200 square feet to 34,000 square feet.

Boeing's maintenance section did about half the work on the balconies. The rest was done by outside contractors. Additional footings were needed to accommodate the new columns. In certain areas the roof had to be raised slightly. But in the main, building alterations were kept to a minimum.

Departmental offices are hung over areas their shops are in.

Why Lewyt Dropped Merit What It's Doing Instead

By ALEX M. LEWYT • President, Lewyt Corporation, Brooklyn, N. Y.

Alex M. Lewyt is one of industry's real "Horatio Algers." He came up the hard way, is in a good position to tell you why his company's new 3-step program to develop foremen works better than merit rating. Here's the plan, as it's now working, to help foremen help themselves to improve.

WE USED TO HAVE a more or less "standard" merit rating plan for our foremen. It had all the usual factors—and also the usual limitations. For higher management, it was mainly another document to cope with when considering salary increases.

For the foreman, its main value was that it served as a jumping-off point for an occasional discussion with his boss about how he was getting along. That was good, of course. But we began to wonder whether there wasn't some better way to get the same result.

We decided there *was* a better way—the way we're doing it now.

In developing it, the first thing we asked ourselves was what we wanted to accomplish. The answer was simple:

We wanted every foreman and group leader in the company to be better today than he was yesterday—and better yet tomorrow.

Why did we want this result? Again the answer is simple: It's elementary good business.

Take our toolroom for example. What makes it different from the toolrooms of our competitors? What gives us the "competitive edge"? It's not the machine tools, or the materials we use. And it isn't even the skill and know-how of our toolroom employees, important though that is.

Our toolroom competition is the next company's toolroom manager. Whatever competitive edge we have is the edge that *our* toolroom manager has over *theirs*, in getting the most out of tools, materials, and skills.

Multiply this example by every department and division you have in your plant, and you'll see the real advantage (or maybe lack of it!) that you have in competition.

The big job is to develop managers who can weld the tools, materials, and skills in their departments into successful teams.

But don't forget this: Your managers—foremen mainly—need help. But they have to do the basic job *themselves*. All that higher management can do is to help each man to help himself.

The question for us was how we could be of *most* help. After much thought, we came up with three kinds of help that we felt foremen needed and could use in sizing themselves up better than the merit rating plan ever did. Here they are:

1. Our annual social and problem-solving get-together—we call it the Lewyt Leader-ama.

2. A self-rating program for supervisors—solely for their own use.

3. A personal conference program for each individual supervisor, in which he leads the conference, and aims to bring out ways in which management can help to do a better job.

LEWYT LEADER-AMA PROGRAM

We think "Leader-ama" is a pretty good name for the annual get-together program that we've started using. We invite all supervisors—about 100—to spend a full day at what's really a "leadership convention" in a downtown hotel. The Leader-ama has three main purposes:

1. We report on the company's progress, problems, and future plans. In part this is done in what we call the "Lewyt panorama," first thing on the program. Here the key executive of each division of the company delivers a brief, factual report. In addition, at the luncheon, I tie these together in a talk that also gives more over-all details that are of value to the supervisors in showing them where we're going as a team—and why.

2. We exchange ideas on leadership principles and related company policies and practices. Our aim is to make good management a more *self-conscious* process. We want to get away from management by "inspiration"—what you might call "hunch leadership." To do it, we try to make several different approaches.

In our Leader-ama last October, we had a panel discussion of leadership principles, then another panel on understanding and interpreting company policies.

Then there was a complete change of pace in the form of a 15-minute address by a distinguished

Rating for Foremen ... and

outside speaker. He talked on the subject, "What's Wrong With the Industrial World?" This talk put some perspective on what we had been discussing among ourselves up to this time. It showed how doing an increasingly good managerial job fitted into the broad picture of business and community progress, too.

3. We exchange ideas on the specific things we can do to improve production and quality. Here the main feature is two big "bread-and-butter seminars," where everybody tosses ideas on the table. There is plenty of discussion, lots of constructive criticism, and a big batch of specific, usable ideas.

One other thing. Woven in with all of the above, we have a fine social get-together of people from all phases of the business. This is topped off with a reception and cocktail party at the end of the day.

This social element is always the "extra dividend" of such affairs. You can almost see better teamwork and understanding of each others' problems grow right there. Never discount social values in holding large affairs like this.

SUPERVISORY SELF-RATING PLAN

You'll see a complete copy of the self-rating form we give to supervisors on page 100. There's nothing complicated or fancy about it.

The form is just a fairly complete checklist of the many responsibilities each supervisor has. By going over it carefully, a supervisor can't help getting a lot of ideas of ways in which he can improve his job performance.

If he's really interested in doing a better job—and I know that most people are—he'll use his self-rating to good effect. Certainly we think that he'll get far more out of such a rating than he would out of having someone else do it for him.

Does this actually work out in practice? We have no statistics to prove it, but we think it does.

Certainly we see evidence of the impact of the self-ratings in our personal conference program (see below). While leading these conferences, supervisors often refer to specific things they have been doing to improve their job performance. That, after all, is what really counts—getting the words translated into some useful action.

PERSONAL CONFERENCE PROGRAM

Every supervisor in most plants has plenty of face-to-face contact with his immediate supervisors and with personnel people. Some of it has to do with his own personal problems. But most deals with the production, quality, and personnel problems of his department or division. These contacts are the life blood of any business, and they go on all the time. They usually solve the problem of the moment, within the limits of policy and practice.

In planning our personal conference program, we wanted to go one big step beyond the "usual" kind of face-to-face meeting. We especially wanted to go far beyond just the momentary problems the supervisor might then be facing.

But how to do it? We didn't want to put the supervisor on the spot by calling him in and telling him how *we* thought he ought to improve. Anyhow, we'd probably be putting ourselves on the spot, too, since we'd then be assuming higher management was perfect and only the supervisor needed to improve.

So we decided to turn about 180 degrees from the usual approach.

We invite each supervisor to be the *leader* of a meeting with his immediate superior *and* that man's boss. The subject in these meetings is "How can *we* help *you*—the supervisor—to do a better job of getting out production?"

Here's how a typical meeting runs:

A foreman—let's call him Joe Jones—is asked informally by his supervisor to drop in for a meeting with him and the manufacturing vice president, (who is well known to the foreman, by the way).

When Joe arrives he's told what we're after, and then something like this is said:

"Now, Joe, this is *your* meeting. We want you to run it. Since we didn't give you any special warning, we've made up a sheet that you may want to use as a checklist of the different matters that you might want to discuss. (For a filled-in copy of this form, see page 101.) There's room for some notes that you might want to make as you go along. We also have copies, so we can write down the things we have to do as we talk."

Joe then takes over. He usually follows the checksheet, to start with, but then begins to move around as he warms up to his talk. Often he will also bring up many miscellaneous points.

You can get an idea of the kinds of suggestions we get by studying the sample form on the next page. Note how specific most of these ideas are. They're typical, since this sample is drawn from an actual case.

Notice, too, that we don't want any pussyfooting on the *personal* problems that may be on the supervisor's mind. The "rate of pay" item in the personal section of the checklist isn't there just for show. We want a good, solid discussion of just what's on the foreman's mind. Does he feel he should be getting more? How much? Why?

Now comes the big question: What happens

after all this palaver? Here you come to the part of the program that can make it or break it.

Joe Jones must get action—or a good solid reason why there's no action.

Some things that obviously need to be done we do at once. Others we can start rolling, but can't get done at once. Others we find on investigation we can't do at all. Every one of these actions is reported back to Joe just as fast as possible.

One of the most interesting facts about this whole process is that we never find the meetings getting "hot" or out of hand. They're just too clearly constructive to give any encouragement to temper-flaring.

Likewise, we find that we don't have much of a problem with suggestions that we do something when it's obvious that Joe is really at fault. It's remarkable to see the dawning comprehension of just what's wrong as Joe continues to talk.

For example: Joe was telling how a simple

SELF RATING FORM

INSTRUCTIONS

If you are curious to know how good a leader or supervisor you are, try to answer each question YES or NO. Answer it honestly. Do not show your answers to anyone – it's your own self-appraisal.

For each answer you marked "YES," give yourself 10 points. For each answer you marked "NO," subtract 3 points. If you did not answer a question – do not add or subtract any points.

If you received 344 points or more, you are a good supervisor and plant leader. If you received between 287 and 343 points, you are a fair supervisor. If you received between 224 and 286 points, you have a lot to learn. If you received below 223 points, you are a poor leader.

So – make your own self-appraisal when you get home – and don't tell anybody about it. The secret stays with you.

SELECTION AND APPRAISAL	YES	NO
1 Do I think of the job requirements and consult the job evaluation book when I hire a man for a job?	___	___
2 Do I think of the man's qualifications carefully to determine whether he fits the job?	___	___
3 Do I observe the man when he starts on the job, particularly the first 30 days of his employment?	___	___
4 Do I pay particular attention to a new employee's quantity and quality of work, his work habits and punctuality?	___	___
TRAINING AND INSTRUCTION		
5 Do I prepare all materials, equipment and tools needed to perform and demonstrate the job for the person I am training?	___	___
6 Do I explain the job to the person I am training and how it stands in relation to other jobs by explaining where his operation fits in the entire unit?	___	___
7 Do I ask the trainee to repeat to me my explanation?	___	___
8 Do I actually demonstrate the job or the operation to a trainee by performing the job, or arranging for someone experienced on the operation to demonstrate it?	___	___
9 Do I make sure that the employee either stands or sits beside me, or the trainee, while the job is being demonstrated?	___	___
10 Do I ask the employee to go thru the operation while I watch and correct any mistakes?	___	___
11 Do I return to the trainee often to observe and correct his work?	___	___

HANDLING PEOPLE	YES	NO
12 Do I show a personal interest in the people in my department by knowing and calling them by first names and learning something of their personal lives, interests and troubles?	___	___
13 Do I praise in public, and criticize privately?	___	___
14 Do I give orders by first explaining the reasons for the orders?	___	___
15 Do I make sure that my orders are clearly understood by asking the employee to repeat my instructions?	___	___
16 Do I make sure that my orders sound like requests – and not commands?	___	___
17 Do I keep track of all the accidents in my department?	___	___
18 Do I instruct employees in my department as to proper safety rules and constantly check to see if these rules are being carried out?	___	___
ENFORCEMENT OF COMPANY POLICIES		
19 Do I make sure that people in my department punch their own time cards?	___	___
20 Do I make sure that people in my department do not smoke on the job except during rest periods and lunch hours?	___	___
21 Do I make sure that no strangers are allowed to come into my department?	___	___
22 Do I make sure that employees start on time in the morning and after rest periods and lunch hours?	___	___
23 I do not have many thefts in my department.	___	___
RESPONSIBILITY FOR PRODUCTION		
MATERIAL		
24 Do I make sure that all materials are on hand when needed?	___	___
25 Do I make sure that all materials are properly counted and identified and transfers made out before leaving department?	___	___
26 Do I make sure that materials are properly stacked to avoid damage to the material?	___	___
27 Do I figure out the best ways of stacking materials to save space?	___	___
28 Do I instruct people in my department how to handle material to avoid breakage, losses and spoilage which cause production lines to stop?	___	___

change in handling a small part by a foreman in an adjacent department would make Joe's department's scrap problem a lot simpler. Joe was making the point that "somebody ought to spend a few minutes telling that fellow . . ." when he suddenly stopped. Not a word had been said to him, but he concluded with something like this: "To hear me talk, you'd think he was a million miles away. I'll see him tomorrow and I know we can fix it up."

Sounds like a small thing? Of course it is. Most of the ways in which experienced supervisors are going to improve will involve what sounds like "small things."

Most important of all, however, is this simple point: Get the foremen to tell you how *you* can improve, and you'll find they begin to give *themselves* a liberal education in ways to improve, too. Then you both get help. It's this mutual assistance, we feel, that makes our plan so effective.

QUALITY	YES	NO
29 Do I enforce the quality standards set by inspection by constantly checking the work in my department?	___	___
30 Do I instruct and explain to the people who work under me what the quality standards are on the particular job and what defects to look for?	___	___
31 When there are defects in quality, do I quickly trace them to the operator responsible for the defects and bring them to his or her attention?	___	___
32 Do I realize that "production, without quality" is no production?	___	___
PRODUCTIVITY		
33 Do I make certain that people in my department do not wander away from their work stations?	___	___
34 Do I observe the layout and methods in my department and make suggestions to improve operations, with a goal of saving manpower and increasing output?	___	___
35 Am I always watchful not to use more people in my department than is absolutely necessary?	___	___
EQUIPMENT		
36 Do I use the equipment in my department properly by not abusing or overloading it?	___	___
37 Do I plan ahead and consult with the engineer on the job to have the right equipment at the disposal of my department in advance for long-run jobs?	___	___
38 Do I inspect the equipment daily to avoid possible machine breakdowns?	___	___
39 Do I take care of the daily lubrication on equipment which requires it, and do I listen for "foreign" noises, which are indicative of possible trouble or breakdown?	___	___
40 Do I check, thru my own supervisor, with Maintenance Department when adding additional loading on electrical circuits of any new equipment?	___	___
TOTAL POINTS	___	___
FINAL TOTAL	___	___

PERSONAL CONFERENCE REPORT

SUPERVISOR'S NAME Mike Moselle DATE Oct. 11, 1951
JOB Machine shop - Lathes + Auto. Screw machines

PRODUCTION Should receive schedules ahead of time so that he can prepare men + machine ahead.
QUALITY Would like to have inspection standards before jobs begin, rather than at the same time they commence.
MATERIALS Tags become lost + material piles up. Has old material in bins that should be cleared up.
PERSONNEL

TRAINING Problem of people being transferred to other depts. for training for higher classified jobs after starting in his dept.
SELECTION & UPGRADING Thinks that on some jobs 30 day trial period is not sufficient to determine new employee's or upgraded employee's ability.
COMPANY POLICY Not clear on policy relative to pay for holiday if employee is sick before or after holiday.
EQUIPMENT Would like to have plates on Gibbs machine replaced. Worn out.

INTRA-DEPARTMENTAL TRAFFIC Would like to have material coming into dept. more clearly identified.
PERSONAL

RATE OF PAY Would like to have Personnel Dept. explain how the classifications + grades in dept. were determined for turret lathe operators Class 1+2
WORKING CONDITIONS Would appreciate additional locker space for dept.

MISCELLANEOUS Differential of rate of pay between supervisors + highest classification in dept. is not maintained on the same basis as in other depts.

IDEAS OF THE MONTH for

By LEWIS K. URQUART • Managing Editor, FACTORY

BEFORE BUYING INDUSTRIAL TRUCKS, New England Power Service Co., 441 Stewart St., Boston 16, makes a wood frame the size of the truck outline and mounts it on casters. Frame is pushed wherever truck will have to go. No more clearance problems.

GOT COLD FEET? Lots of your employees will in the next few months. Might try a Goodyear Tire & Rubber Co. rubber foot warmer. It's made of of Pliotherm—same thing used to de-ice propellers. Plugs into any outlet. Develops temperatures up to 100 F. Write to Akron for more information.

IF YOU'RE WORTH YOUR SALT as a plant engineer, you know that "what's best today can always be improved on tomorrow." A case in point: Geon coating on low-carbon nuts and bolts make them as corrosion-resistant as stainless. (See page 142.)

IF YOU NEED TO TOUCH UP your equipment finish, Powr-Pak's color-matching service may be your answer. They'll match your formulation and package it in Aerosol dispensers. Details from Powr-Pak, Inc., 1480 Barnum Ave., Bridgeport.

WHAT! DE-PALLETIZE? Sure. At least International Harvester isn't afraid to buck the trend. IH is finding lots of places where it can make up unit loads without pallets. It saves materials, cuts shipping fare and dunnage. (See page 117 for more details.)

BOOKLET OF THE MONTH. Read the 1500 uses for industrial tape and you're bound to find a lot of places you aren't using it and could. Write Polyken Industrial Tape, 222 W. Adams St., Chicago, for a copy.

HOT SPRAY is Arco's new system for applying lacquer and enamel finishes. You thin the coating with heat, not solvent. Maker claims you can save 50% in time and labor, control quality better, and cut rejects and solvent costs. Write: Arco Co., 7301 Bessemer Ave., Cleveland 27.

METAL-CALS are Boeing Airplane Co.'s replacement for paper appliques used in hundreds of places in a plane. Boeing has licensed C & H Supply Co., Seattle, to make the almost abrasion-proof aluminum appliques.

HOW ARE YOUR TELEPHONE MANNERS? Standard Register Co. of Dayton had Ohio Bell check theirs. Found out a lot, too. Improper telephone practices tied up phones, wasted time, gave customers a bad impression. Now Standard Register has a training course to correct bad manners.

LOSE PAGES from your loose-leaf binders? You can stop it with a machine that punches the holes and reinforces them in one motion. Stationers Supply Co., 82 Wall St., New York 5, sells it for $5.

RADIATION "DOG-TAGS" of supersensitive glass will tell the degree of exposure to atomic radiation of the wearer when exposed to "black light." Made for the Navy by Bausch & Lomb Optical Co., Rochester 2, N. Y.

Factory Executives

BET THEY GET GOOD READING of company rules and regulations at the Engineering Works Div., Dravo Corp., Pittsburgh 25. A 40-page booklet lists them all in words and cartoons. Dravo has also combined safety practices with such things as work schedules and union activities.

TWENTY "SOUND" IDEAS TO SAVE money, materials, and manpower with tape recordings. Get Minnesota Mining & Mfg. Co's. 16-page booklet from 900 Fauquier St., St. Paul 6.

WHITE OVERALLS FOR A POWER PLANT CREW? Yes. We know a power plant that issues 'em. If they get dirty, the place isn't clean.

VALETERIA is a fancy name for a place to leave dirty clothes for the cleaner to pick up. They have one at Thompson Products, Inc., 23555 Euclid Ave., Cleveland. Employee calls the cleaner, is assigned a locker. He can pick up his clothes, cleaned, 4 to 7 hours later.

$1500 IN PRIZES for your "happiest experience with used equipment." First Machinery Corp., 157 Hudson St., New York 13, is running the contest. Submit entries to: Contest Editor.

12½-OZ. GRINDER, made by Newage International, Inc., 235 E. 42nd St., New York, operates at speeds up to 70,000 rpm. Ideal for delicate work.

ALICE IN WONDERLAND'S WALRUS takes you through "Alloys in Copperland"—The Cooper Alloy Foundry Co.'s latest booklet. In poetry, prose, and pictures, you (and the kids) get the story of copper alloys. You can get a copy from the company at Hillside, N. J.

HOW THIN CAN STEEL GET? Down to one-tenth the thickness of a human hair, says Armco Steel Corp. How thick a pile of scrap steel do you have in half a dozen places in the plant? Check and cash in your scrap.

NAME SIGNS, hung from the ceiling, identify who sits where in large office areas at Aeronautical Products Div. of Minneapolis-Honeywell Regulator Co. (Minneapolis 8). No time wasted looking for Charlie.

SEVERAL DUTCH PLANTS have a simple way of keeping track of what's left to do on an order requiring several operations. They simply number the operations in reverse order. The first of 8 operations is #8, the second is #7, etc. Number of unfinished operations is obvious.

WHIZ TUBES are the newest wrinkle in pneumatic tubes. And you don't need carriers. Just slip the paper in a slot; air takes it where you want it. International Tel & Tel just made an installation for Dun & Bradstreet.

ADDRESSOGRAPH PLATES simplify duplication of production orders, save filing space for the Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8. File holds one or more plates for each order. Coding of date keeps number of plates down. Order copies are made directly from plates.

Four Handling Ideas Pay Off Fast

The Maytag Company put these four slick ideas together to make a fast handling system for automatic washers. Chances are you can adapt some to handling your particular product.

By W. R. STEINBERGER, Production Manager
Plant 2, The Maytag Co.
Newton, Iowa

PRODUCTION WAS RUNNING SMOOTHLY at the Maytag plant until management held a conference. The decision: *double production.* All of a sudden the plant—although it was new—was much too small. We needed more space.

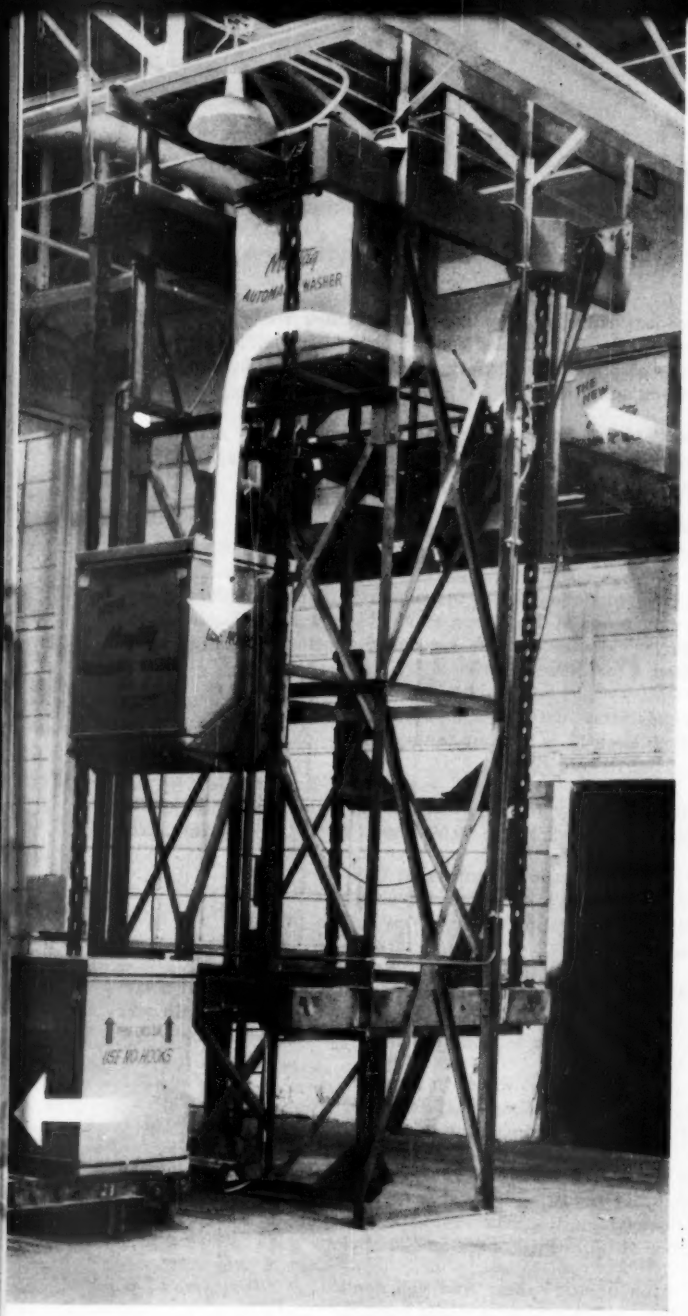
The solution: About 50,000 square feet of warehousing and shipping space was turned over to manufacturing. Plans were made to put up an addition to give space to warehousing and shipping.

The area set aside for the addition was divided by an indoor railroad siding. That meant every washer produced had to hurdle the tracks to get to storage.

Here are the changes we made: We installed a "Ferris wheel" conveyor to get washers across the tracks. A special stacker automatically stacks the cartons two-high, so one truck handles two at a time. And we made a couple of modifications in standard fork trucks. These changes gave us the handling system shown in these pictures.

Did the ideas pay off? Yes. We backed up the ideas with an investment of $14,000 in equipment. The equipment has been in a year. It will be paid for in another six months. Direct savings, $8000 a year. Here are some other benefits:

- We transferred half our warehouse crew to production.
- The modified trucks speed shipping and storing operations.
- The lip attachment we put on the frame of our forkless fork trucks have cut 2½¢ from the cost of moving each carton.



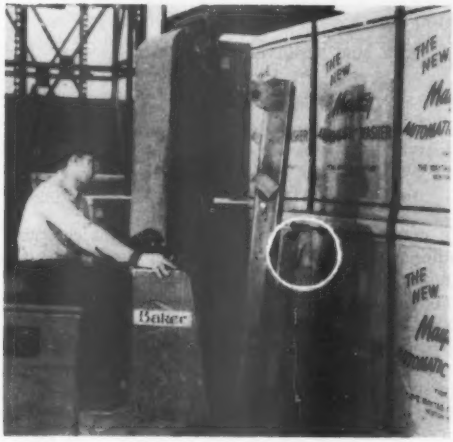
1 • "Ferris wheel" conveyor hurdles siding

To get across the railroad siding, washing machines ride this Ferris wheel. Beyond the wall, fork trucks load the conveyor. Cradles lift the cartoned washers up to a horizontal section of power roller conveyor that spans the tracks. Cradles also lower the cartons. A limit switch prevents jamming.

2 · Stacker tiers washers two-high

Jaws agape, the stacker is ready to grab the first cartoned washer off the Ferris wheel. As the carton enters the stacker it trips the limit switch. Jaws then grab the carton and raise it enough to permit the second carton to ride under it.

When the second carton enters the stacker it trips the same limit switch. The first carton is released and dropped onto the second. Then the two — neatly stacked — roll by gravity to the warehouse. Fork trucks remove them for shipping or storage.

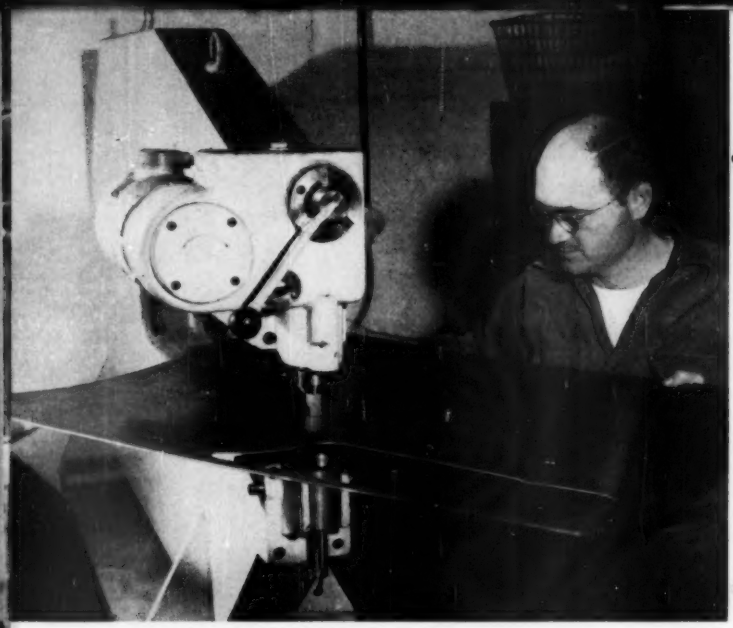


3 · Forkless fork truck eliminates skids

Lip (circle) attached to the frame of this forkless fork truck handles two cartons at a time — it hooks under the lid of the lower carton. Back plate prevents damage to cartons. Skids have been eliminated. Lip has cut round-trip time 66%.

4 · Chisel forks move four washers

Four washers at a time can be moved from the conveyor for warehousing with this truck equipped with chisel forks and a special back-up rig. Two clamps hold load at the top. Thin wood spacers (circle) between pairs make it easy to insert forks.



EQUIPMENT WANTED in this typical example of a Glenn L. Martin expenditure analysis is a new saw (plus attachments).

ANALYSIS OF SAVINGS was made by manufacturing research. Since machine is not required by new product or process, sole basis for deciding whether to buy is: Will it pay for itself fast enough? Present known work-load for machine runs six months, and it will pay off in 1½ months. But it is also estimated that the machine can be used six months each year for 15 years (a typical amortization period). As shown in last two lines, that means a total estimated saving of $48 for each dollar spent.

P.S.—Martin bought the equipment.

HERE'S THE WAY GLENN L. MARTIN DECIDES

How to Get the Most Out of

A Facilities Control Board sits on the company treasury. It gives money to buy equipment only to those who can prove they've got a real need, or a quick return on the investment.

The control plan pays off—in better use of existing equipment, in better use of money available for investment in new facilities.

By R. BURT SCHULTZE • *General Supervisor
Manufacturing Research & Development
The Glenn L. Martin Company, Baltimore

*When article was written. He's now Chief, Electronics Tooling.

TO TEST YOUR READING ABILITY...

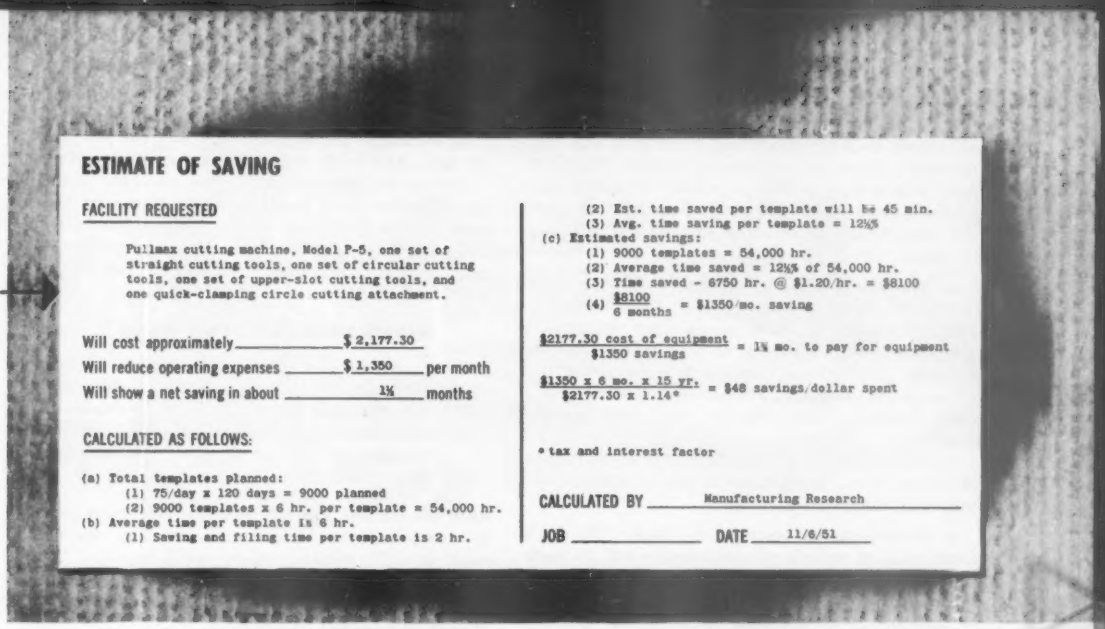
Read this article — including headings and captions — at your normal rate of speed for general information. Record your exact reading time in minutes and seconds; use a stop-watch or watch with a second hand. Be sure that as you read you understand the various phases of the program described in this article. When you have finished reading, answer the questions on page 260.

WE COULD GO OFF THE DEEP END buying capital equipment—if we didn't have strict controls. But I'm sure the Glenn L. Martin Company, or the aircraft industry, doesn't stand alone with this problem. Every company must decide how much and what kind of equipment it should buy.

An organized method of making each decision can save money. Also, it's the best guide toward effective use of available equipment—and that's very important to high production.

We figure our control plan has saved us hundreds of thousands of dollars. Here's how:

- **By limiting new equipment purchases to items that are absolutely necessary—and items that pay off in a hurry.**
- **By pointing out the best solution to each question of how much and what kind of equipment.**



ESTIMATE OF SAVING

FACILITY REQUESTED

Pullmax cutting machine, Model P-5, one set of straight cutting tools, one set of circular cutting tools, one set of upper-slot cutting tools, and one quick-clamping circle cutting attachment.

Will cost approximately $2,177.30

Will reduce operating expenses $1,350 per month

Will show a net saving in about 1½ months

CALCULATED AS FOLLOWS:

(a) Total templates planned:
  (1) 75/day x 120 days = 9000 planned
  (2) 9000 templates x 6 hr. per template = 54,000 hr.
(b) Average time per template is 6 hr.
  (1) Sawing and filing time per template is 2 hr.
  (2) Est. time saved per template will be 45 min.
  (3) Avg. time saving per template = 12½%
(c) Estimated savings:
  (1) 9000 templates = 54,000 hr.
  (2) Average time saved = 12½% of 54,000 hr.
  (3) Time saved = 6750 hr. @ $1.20/hr. = $8100
  (4) $8100 / 6 months = $1350/mo. saving

$2177.30 cost of equipment / $1350 savings = 1⅝ mo. to pay for equipment

$1350 x 6 mo. x 15 yr. / $2177.30 x 1.14* = $48 savings/dollar spent

* tax and interest factor

CALCULATED BY Manufacturing Research

JOB _____ DATE 11/6/51

$ Available for New Equipment

WHO CONTROLS WHAT? A division head, such as the chief executive of manufacturing or engineering, may authorize capital equipment expenditures up to $500—if the items are already in his semi-annual budget. If not, he must get Facilities Control Board approval. The Facilities Control Board includes the vice president in charge of manufacturing, assistant general manager, controller, and heads of some operating departments. This board may authorize expenditures up to $25,000—if the items are in the budget.

The president of the company must approve budgeted expenditures of more than $25,000, and non-budgeted items costing more than $500.

The budget is only a tentative forecast of capital expenditures, based on estimated needs. It's necessary for company officials to make financial plans ahead of needs. Naturally, some requirements arise after the budget is drawn — mostly emergency items. The facilities control plan supplements the budget, screens budget and non-budget items when they are detailed.

FOUR WAYS TO INVEST—OR NOT TO · The need or desirability for new capital equipment springs from four sources: increased production, availability of improved equipment, new processes, and high maintenance costs. But the answer isn't always new equipment. It might be more economical to change existing equipment or methods. Or perhaps subcontracting is the best way out.

Here's how we investigate each proposal:

1. If we must increase production · Before we order more equipment we try to find a way to get more out of what we have.

If more of the same product is needed, we can often get more production per machine hour because of longer runs per setup, better methods, better tooling, or better skill with repetition. All operations have production standards that are used for cost control. We examine the standards, study the operations to find how much faster we might produce the higher volume rate.

Scheduling machines to operate more hours per week is another way to meet bigger production requirements. We check that possibility, too.

After we know how fast we can produce, we compare equipment hours available with equipment hours needed. The difference tells us how much more equipment to request—if we still need it. Staff and operating departments work together to develop such problems to this point.

2. If improved equipment becomes available · Manufacturing research keeps our management group posted on new and improved equipment. This group reads magazines to find out what others

are doing, studies advertising, talks with vendors. Ideas are passed on to those interested. Anyone's idea for new or improved equipment works its way to the division head. He gets an analysis of what the idea's worth in terms of how fast it will pay for itself.

3. If a new process is introduced • This is more than just a new or improved machine that performs the same function as existing equipment. This is a brand-new way of production, such as our own hard-coating process for improving the abrasion resistance of aluminum. New processes come from our own research, and from outside sources.

Again we investigate carefully the possible rate of return on our investment in new equipment required by such new methods.

4. If maintenance costs get too high • We don't keep running records of maintenance cost on each individual piece of equipment. We do keep such records for groups of equipment — such as presses or millers—in an operating unit. If the maintenance cost of a group of machines gets out of line, the supervisor knows which one is causing the trouble. We check the file of job-time cards to get comparative costs. We figure it's cheaper to do the occasional search job than to maintain individual machine records.

High maintenance cost of a machine doesn't always dictate replacement. Sometimes correction lies in better tooling, or keeping loads within the capacity of the machine.

WHAT'S NEXT? Having gathered facts and figures on the proposed capital expenditures, we work up an estimate of savings (see sample on page 107). This is the most critical step because this is the point at which we carefully explore all the facts and figures, all the alternatives to the proposal. It can be simple—like the example—where savings are easily calculated and alternatives aren't worth considering. Or it can be complex—where there are intangible advantages or disadvantages, where alternatives appear as good or maybe better.

What are the intangibles? The availability of necessary skills. Current research that might bring forth a new production process. Possible changes in design of the product. And others.

At this stage we might decide to adopt an alternative, drop the new equipment idea.

There may be another way to do the job • For instance, it might appear we need more routing machines to handle greater production. Routing is cheaper than blanking at certain production rates. But a pin router takes about 150 square feet of space. Trained operators may not be available. And we might have surplus blanking-press capacity. The excessive work load may appear of short duration. In that case we would probably adopt the alternative of blanking.

Or we might decide to sub-contract the job • If the projected work load is beyond plant facilities, it may be the best solution. Here are some of the questions we must consider: How long will this work load last? Can we get the necessary facilities and equipment, and in time? Does the work require special skills that we don't have, and maybe can't get?

HERE'S HOW THE PLAN WORKS

But to explain how our control plan works, let's assume we've decided new equipment (costing over $500) is the answer. If it's absolutely necessary to meet production requirements, savings are incidental. Otherwise, the savings determine whether we carry the idea further.

HOW WE FIX THE PAY-OFF PERIOD • We don't have a fixed policy that new equipment must pay for itself in "X" months before we'll buy it. "X" changes from time to time, depending on:

1. How much money is available for investment in desirable capital equipment?

2. Is it likely we'll be making the same products for a long time or will we be changing the design?

3. Will current research and development change the process we're considering?

4. How many proposals are on hand, and what's the average rate of pay-off?

We watch current policy on pay-off time as shown by proposals approved by the Facilities Control Board. But we don't limit proposals to an exact average of what the board is approving. We often give them proposals even though we expect them to be turned down. We let the board make decisions on the close ones.

THE FINAL STEP • When we decide to submit a proposal to the board we describe it on a "Request Appropriation of Funds" form. It gives the board members a quick picture of the information they need. Naturally, they get any additional data they need to make a decision—to approve, reject, or defer.

If approved, we schedule the project for procurement and installation. From there on it's just a matter of everyone doing his job to get the new equipment going.

The savings claimed for the new equipment can be automatically deducted from the operating cost budgets when the equipment is installed. It's up to supervision to meet the new budget—and save the amount predicted.

Cash in Your Scrap!

When you *earmark* obsolete equipment for the scrap drive, you are helping to improve your company's profit position, and also helping to keep the mills turning out the steel needed for national defense.

..."That Darned Salesman!"

By RAY W. SHERMAN

TOBIAS QUINT, plant manager of Central Manufacturing, could stand it in his office about so long before he had to go and "inspect something." The new car loading setup in the shipping department would do as well as anything, so he took off.

He called "Hi, Tom!" in the door of Foreman Callahan, his one-time shopmate, stopped by a lad stacking pallets with a fork truck, and veered across to the office of Ivy Corke, superintendent of Production A. But he didn't go in, for Corke was talking to a young man Toby had never seen before. He paused a moment. The young man left.

"Hi, Ivy!" Toby parked in the still warm chair.

"Hello, Toby." Corke's smile stuck a bit and his hand fumbled nervously with some literature on his desk. "Plant still running?"

"Seems so." Toby jerked his head in the direction the young man had taken. "Hiring a new man?"

"Him!" Corke's voice shot up. "Heck no-o-o!" His lips tightened. "Listen, Toby! How's a guy going to get rid of these pests?"

"Pests?" Toby's forehead wrinkled. "Wha'd he want? What happened?"

"Just wasted time! I wanted some dope about that variable-speed drive I spoke to you about, so I wrote to Tri-X and asked for a catalog, which is all I wanted, and next thing I know it's being delivered personally by a guy who says he's a sales engineer, but he's nothing but a salesman, and he says his job is to help me, and—" Corke flung his hands wide. "How'm I going to duck the pests?"

"Maybe you don't want to." Toby didn't smile.

"Don't I? Just show me how!"

"Listen, Ives." When Toby called him "Ives" Corke knew something was afoot. "These fellows have to sell their stuff."

"Maybe they do." Corke whittled off a nub and tossed the rest of the tobacco plug to Toby. "But why take it out on me?"

"I've learned a lot from salesmen in my time." Toby tried to decide just where on the plug to put the knife. "Any good salesman knows a lot—even about our business. Engineer? Maybe yes. Maybe no. But I try to listen to 'em. Sometimes it's better and quicker than reading a book.

"You want to know about variable-speed drives. And in comes a guy who knows all about it. Really, he's much better than a catalog. He'll leave—if you ask him to. And, Ivy—" Corke was glad to be out of the "Ives" class again "—these guys have to make a living, for themselves and their outfits. Ever ask yourself where Central Manufacturing would be if nobody listened to *our* salesman?"

Corke's only comment was a "Humph." Toby rose to go. "Just a minute!" Corke reached for the catalog. "This drive! In a year's time it would save us—"

"Get that saving out of a catalog?" Toby asked.

"Wel-l-l—" Corke pulled at an ear lobe.

"Maybe," Toby grinned from the doorway, "you better take that salesman along when you push this idea at the budget committee."

Do you feel supervisory training is "too intangible to measure"? If so, you'll get some guidance out of this interesting try-out of a novel measuring method.

The method uses a well-known standard test that anyone can buy cheaply. The test will help you to sell your training. And it will help the trainees directly, too.

SUPERVISOR	BEFORE TRAINING (FORM A)	AFTER TRAINING (FORM B)	% IMPROVEMENT
1	59	50	−15%
2	58	61	5
3	57	63	11
4	56	62	11
5	52	62	19
6	52	66	27
7	52	63	21
8	50	54	8
9	49	57	16
10	42	49	17
11	40	52	30
12	37	49	32
13	30	35	17
14	19	36	89
15	16	31	94
AVERAGE	44.6	52.7	18%

HERE'S HOW 15 SUPERVISORS SCORED on the "How Supervise" test before and after taking Industrial Tape's supervisory training course.

Here's a novel method you can use to

Measure Results of Supervisory Training

By ROBERT B. WYLAND
Assistant Personnel Director, Industrial Tape Corporation
New Brunswick, N. J.

LIKE MOST OTHER COMPANIES, we've always looked on supervisory training as thoroughly worth while. But, until recently, we've also been like others in that we have felt that such training produces results that are too intangible to measure.

That's probably right if you're looking for big dramatic changes in production as the direct result of supervisory training. Nor can you realistically expect to see similarly dramatic changes in turnover, absenteeism, or injuries. Usually many things happen, all contributing to improvements that you can measure in these areas. You don't know how much is really due to any one factor, including training.

One solution which we have tested at Industrial Tape seems to show real promise.

We use a well-known standard test to give us "before and after" scores for each man who takes a supervisory training course. This gives us an objective measure of the trainee's improvement. We also discuss the test results, and encourage foremen to apply what they learned. Thus, we also get additional benefits out of this approach.

The test we used is called *How Supervise*—by Quentin W. File and H. H. Remmers. It comes in two forms—A and B. (There is also a Form M for higher management levels.)

Any reputable company can buy the necessary forms for the test. You get them from the Psychological Corporation, New York City.

RESULTS OF THE TESTS

The table above gives the actual results of before and after testing for 15 foremen and office supervisors who went through our regular supervisory training course, beginning last January. They all filled out Form A of the *How Supervise* test before the course and Form B afterwards.

Foremen were asked to use pen names to conceal their identities. But they also understood that they could discuss the results by simply asking about them at the end of the program. Everybody wanted to know how he did, so there was no problem in finding an opportunity to talk to each person.

Only one man (No. 1) failed to show improvement. In fact, this man's score actually was *poorer* after training. To find out why, we discussed the whole matter fully with him. We quickly discovered that he had undergone an upsetting personal experience just before taking the second test. On looking back, he felt that he had probably been less successful in taking the bad news in stride than he had thought at the time. At any rate, he felt that

was the real reason for the drop-off in his score.

This little example shows how you can begin to get beneath the surface by using *How Supervise.*

The group's average score on the first test was better than 75% of the 3000 scores listed in the "norms" or standards that came with the test from the publisher. In other words, the group as a whole was good to start with. This made it unlikely that many phenomenal improvements would show up. Even so, the second test showed the group's average was higher than the scores of 92% of the men on whom the test was standardized.

The average amount of improvement for the whole group was 18%. But the actual spread of improvements was from 5% to 94%. Though the table shown here doesn't reveal it, it is also interesting to note that the high and low scores on the first test were made by people whose experience suggested that they should perform just as they did.

Now for the big statistical question: Could these "improvements" have been due simply to *accident* or *chance*? The answer, of course, is that they could, at least as far as the 18% group average gain is concerned. But a check of the statistical probabilities for the group average shows that there's less than one chance in 10 that the improvement is due to chance. In addition, the fairly large number of *big* improvements by *individual* members of the group, gives us reasonable grounds for concluding that the training really influenced supervisors' attitudes.

OTHER USES FOR *HOW SUPERVISE*

Here's another question you certainly can't duck when talking about using a test to measure results of training:

How do you know that the foreman's changed attitudes (as shown by the test) are actually going to be carried over to the job?

The answer, of course, is that you can't tell whether the foreman has actually changed on the job unless you undertake a complicated research study. You would have to spend weeks and months at it, measuring the before and after reactions of the people working under the foreman, and checking every conceivable measure of the foreman's productive use of his time.

But that doesn't mean that you must give up, and merely *hope* that the foremen will carry their training over to the job. In our case, we have found that it's desirable to use the tests as the basis for a series of discussions with each man to help encourage him to apply what he has learned.

1. We discussed the scores on the tests with each man. No one saw anyone else's score, of course—just his own, and the group averages.

Warning: We felt—and think others should, too—that you can't be too careful in the way you interpret test scores.

Until you have quite a lot of experience with any test, it's dangerous to try to tell what scores are "good" or "bad." You may be quite wrong, to start with. And, even if right, you may do a lot of damage by unnecessarily disturbing and worrying a man about how he compares with his fellow supervisors.

What you're really trying to do is to get him to improve in relation to *himself*. For this reason, we were careful to use the utmost discretion in interpreting scores.

2. We reviewed the wrong answers with each man. Previously we had made a check of the number of times each question was missed. This helped us spot questions that a great many people missed. These we could discount (in Form B) as probably not properly emphasized during the conferences. But where a man missed questions that almost everybody else had passed, we could point this fact out to him, and suggest that the misunderstanding was probably his own fault. Out of this analysis we got some excellent clues as to things to emphasize in future training programs.

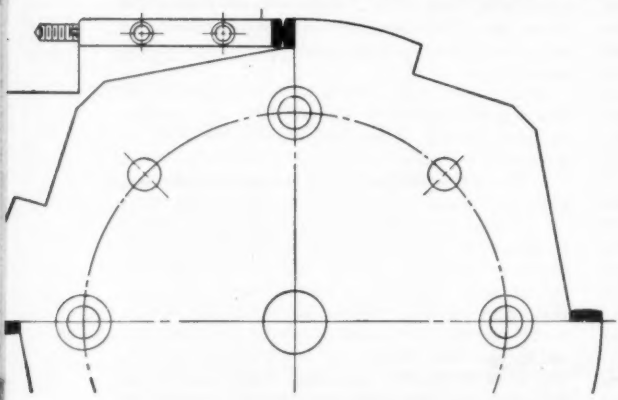
3. We emphasized the importance of using what each man knew in his own job. That, of course, was also the aim of the training course itself. We tied this point in with our own evidence of the importance of close attention and frequent repetition of basic ideas. To do this, we analyzed our attendance.

Though attendance was excellent, there still were enough absences to permit us to reach this conclusion: Those who attended 14 to 16 sessions had, on the average, 20% more improvement in their scores than those who had attended only 10 to 12 sessions. We carefully explained this, on the grounds that it showed up a key learning principle that every foreman should know. They quickly saw the point: Repetition of the same basic principles again and again in discussing the many different subjects in the training sessions drove them home, and increased the chances that they would be automatically used in practice later on.

4. We compared scores with published norms. We emphasized this type of comparison rather than comparisons among the men themselves. Because our foremen's scores compared favorably with the scores of a group of representative outsiders, we felt this was a sound thing to do. The lowest of our men was better than 50% of outsiders, and our best man was away up at the top, at 92%.

5. We answered questions. Everyone at some time in the interviews felt obliged to criticize the ambiguity of some of the questions. This commonly happens whenever you go over test results. It gave us a good chance to discuss the importance of right attitudes in approaching a test of this sort—also in approaching the same kinds of problems in actual practice. It was easy to show in almost every case that, despite claimed ambiguity of questions, scores had gone up after training.

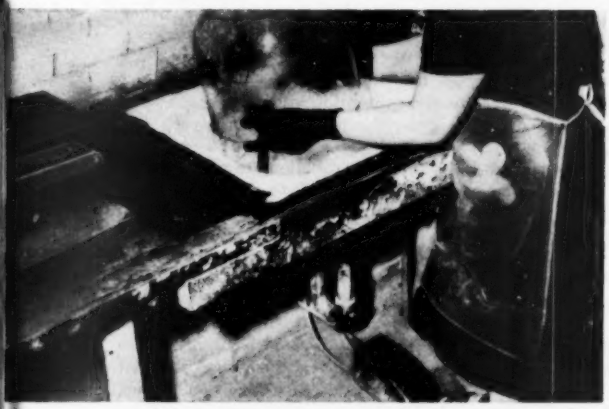
OPERATING SHORTS



Carbide Inserts Save Index Plates

Index plates have been made almost "wear-proof" at the Fort Wayne works of General Electric Company by putting cemented carbide inserts on the stop faces. The inserts are modified so the impact face is dome-shaped.

After a year of use the carbide blanks show no signs of wear from the repeated impact load. Wear on adjacent parts also has been eliminated. Before the carbide inserts were used index plates sometimes needed replacement every two or three weeks.



Spray and Pedal Stop Glass Breakage

Breakage of bell jars while they were being washed posed a problem at Precision Metalsmiths, Inc., Cleveland. The jars cost $58 apiece and replacement takes up to a year.

Problem: Operator used to hold jars under the faucet with one hand, swab them out with the other. It was all too easy to let one slip, and even a chip made them useless.

Solution: An inverted spray, controlled by a foot pedal. Operator has both hands free to hold the jar. Force of the spray and gravity clean the jar well. This idea, dreamed up by Steve Kriska, plant engineer, has saved upwards of $600 at a cost of $90 for installation.

Sloped Box Aids Scrap Disposal

Here's one from a printing plant—the Lazy Daisy Hell Box, invented by George Fletcher of Progress-Bulletin Publishing Company, Pomona, Calif.

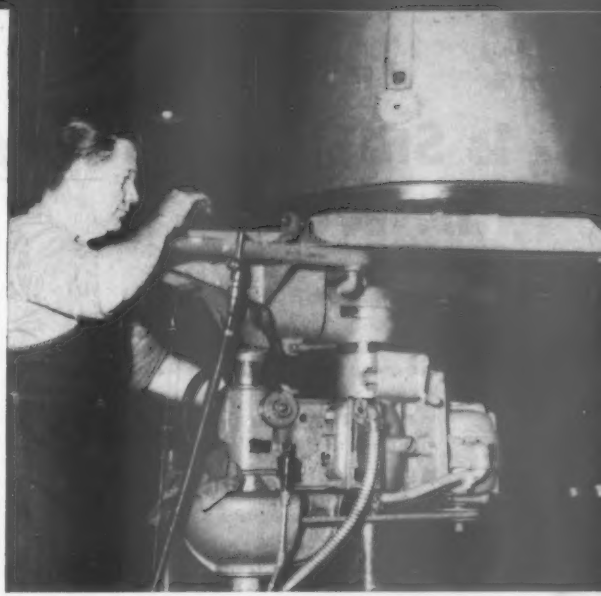
Traditionally, the thin pieces of scrap metal are thrown into a box on the floor. Some hit, some miss. The box has to be lifted to be emptied, and the overflow must be swept up.

The Lazy Daisy has been lifted up so it's even with the top of the work bench. Scrap slides right off into the box—it can't miss. Bottom of the box slopes to a hinged door. To empty it, janitor wheels up his cart, lifts door, and out slides the scrap. It's all there, all clean.

Inverted Drill Press Deburrs Holes

An inverted drill press speeds deburring holes in jet engine cones at Ryan Aeronautical Company, San Diego.

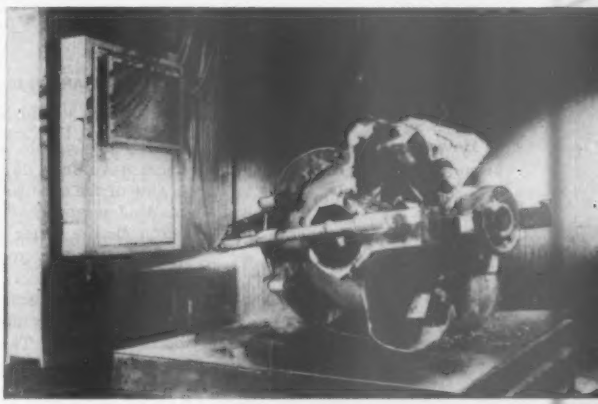
A standard drill press was inverted and mounted on a pedestal. Cone, placed in fixture by electric hoist, rests on rollers supported by ball bearings and can easily be turned by hand. It is located by index pins. A standard retractable-type deburring tool cuts burr from the top side of the hole. Operator controls pressure of the tool by foot pedal, removing burr without cutting into metal.



Air-Conditioned Cab for Sand Blaster

An air-conditioned, monorail-mounted cab for the operator has tripled production in the hydraulic sand blaster at Falk Corporation, Milwaukee. The cab eliminates the heavy rubber clothing and air hose previously worn by the operator. It also eliminates operator fatigue from handling the high-pressure blasting hose manually.

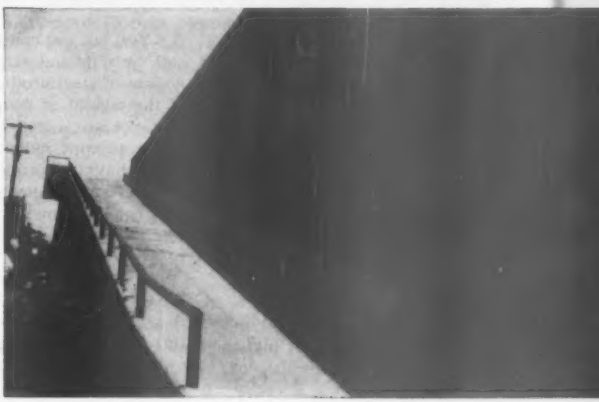
The cab moves around three sides of the room on the monorail track, also up and down. Mobility of cab, plus rotating blasting gun on turret-type mounting, completely cover work. Operator, in a comfortable cab, does a better job faster.



Roof Parking Solves a Problem

Parking space for 400 cars and a locker room on the roof is one company's solution to the parking problem in a crowded city. Parthenon Press, in Nashville, built the roof parking space and locker room as part of their $2-million expansion program.

Separate up and down ramps were built at one side of the building. Parking spaces are marked off and numbered, and one is assigned to each employee permanently. One attendant is on the roof all the time, another assists him at shift-change time. The employee leaving his car changes in the roof locker room, then goes down an inside stairway to work.



Is Steel Scrap Really So Scarce, Mr. Wolcott?

Many skeptics in industry are asking that question. They don't "buy" the idea that it's *really* scarce.

FACTORY put this and other scrap questions to R. W. Wolcott. He's chairman of the American Iron and Steel Institute's scrap committee, and chairman of the board of Lukens Steel Company, Coatesville, Pa.

Here are his frank answers.

FACTORY'S QUESTIONS:

WOLCOTT'S ANSWERS:

Q. How much steel has been lost because of the scrap shortage?

A • It's not feasible to claim a production loss—up to now. Some furnaces have been down a few days, but the tonnage lost is small.

One of the most serious production problems is shortage of #1 heavy melting scrap. That's bulky scrap. It allows the furnace to melt the scrap charge faster than light scrap permits. There's been a shortage of #1 heavy melting scrap for several years, which has hurt production.

The steel producers need more heavy scrap. But they're also eager to get practically any kind of industrial scrap today—to keep furnaces operating. They don't have enough scrap—especially #1 heavy melting—in stock to feel secure in their ability to keep steel coming out at a record rate.

Q. Won't this high production rate automatically return more scrap to the steel mills?

A • Yes, but not enough. More steel tonnage creates more of what we call "prompt industrial" scrap. In normal periods about 13% of the weight of steel products shipped comes back as scrap. And about 5% of the weight of iron castings. In periods of war economy the percentages are a little higher.

But prompt industrial scrap accounts for only about 1/3 of the scrap that steel producers need from sources outside their mills. The other 2/3 must come from "obsolescence" scrap. By that I mean scrap that comes from the retirement of iron and steel products from active service.

Q. Are the scrap dealers holding a lot of scrap, hoping for higher prices?

A • The dealers are *not* holding back the scrap. If you have seen a full yard, that's good. It's the best assurance that scrap's on the way to the furnaces—after it's sorted, prepared, and shipped. That's why it's in the yard. Latest Bureau of Mines figures I have right now show

the dealers have a little over a million tons. Compared with current consumption of 3-million tons a month, that's not much—less than two weeks' stock.

NPA has the authority to distribute equitably the scrap held by dealers and mills. It's using such authority where allocations are necessary.

Q. Is the shortage only in certain kinds of scrap, such as alloy scrap?

A • The steel and foundry industries need all types of scrap. As I said before, #1 heavy melting scrap is especially needed to speed production. But it doesn't seem possible to get as much as we'd like.

Q. If scrap's so scarce, why aren't we having public drives for household scrap?

A • We may come to that. But it will be the last source to be tapped. That's because World War II experience taught us it's not good scrap. Bed springs and baby buggies, coat hangers and cooking utensils make light-density scrap. More volume is required to make a given weight of furnace charge. That means slower charging and melting, less production.

Tin cans are another problem. Even though the coating of tin is only a few thousandths of an inch thick, that's enough tin to spoil the quality of steel.

Q. Are steel companies getting any scrap from foreign countries?

A • Practically none—at the present time. Our government is taking steps to bring to this country scrap that's under its control in Korea and some islands of the Pacific. Also, our government is trying to influence India to send us some scrap. A mission to those countries reported about a half million tons is available.

But the scrap shortage is world wide. England actually has idle plants due to lack of scrap. The United States wants Western Europe to make as much steel as possible. Therefore, it's doubtful that we'll receive additional scrap from there. The same situation exists in Japan.

Q. If a plant has been doing a good housekeeping job, is it likely to have extra scrap around?

A • Hundreds of spot checks satisfied us that there are few, if any, plants that have no obsolescence scrap. Also called "dormant" scrap, it's mostly machines, tools, and equipment which have been saved for a potential use that no longer exists. It's human nature for individuals to save and hoard. A new piece of equipment replaces a worn-out machine. The superintendent almost invariably places the old machine in some corner, or outside the building. He expects that someday a piece of it will come in handy for a repair job. It also invariably happens that the old machine, or part of a machine, is forgotten. That's a typical example of the scrap we're asking industry to flush out. In the hundreds of companies where a chief executive has taken the responsibility of deciding whether such old equipment shall be kept or scrapped, not a single instance has failed to produce some tonnage.

Q. Will a plant's steel supply be affected by the amount of dormant scrap it turns in?

A • Indirectly, yes. Steel products are subject to NPA allocation. You can't get more steel for a particular tonnage of scrap. However, lack of scrap will cut steel production. That may result in your not receiving all the steel allocated to you. So, you are benefiting yourself by turning in your scrap.

10 Good Ways You Can

Save or Salvage Scarce Materials

Put these in your scrapbook. Use them as they are, or let them be a guide to show you how you can save hard-to-get materials with just a little planning.

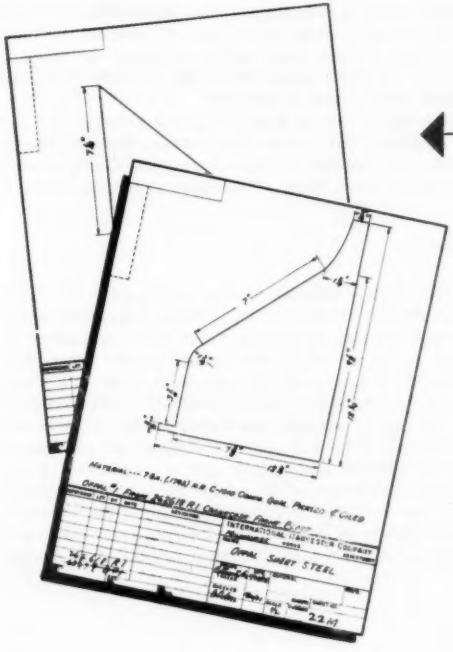
By J. W. ARMOUR • Manager
Manufacturing Research Department
International Harvester Company
Chicago

WE'VE HAD A PROGRAM for saving and salvaging materials for many years. Some of these 10 salvage ideas have been in operation in our plants for some time.

When we started the program, the major emphasis was economy. Now, with many of our materials on the critical list, we've switched the emphasis. Now, it's *get as much production as possible with the amount of material available to us.* If we save money, too, all well and good. That's bonus.

We've been impressed with the savings that our plants have made with the program. Both with ideas we've suggested and with ideas that they've developed themselves.

If, when you've read this, you're impressed, try the ideas in your own plant. Anyone can do it. You don't have to be our size to come up with good ideas.



You'll get a lot more ideas about saving and salvaging from R. W. Wolcott's frank answers about the steel scrap shortage on page 114.

1 SHEETMETAL OFFAL • We circulated a memo last spring suggesting that each plant study its sheetmetal offal in an attempt to use these pieces for making smaller parts. Offal for which the plants have no direct application is interchanged with other plants. This process is speeded up by circulating sketches that give dimensions, material specification, and availability.

Results: Our East Moline, Ill., plant, in the first 10 months after the memo was circulated, made 263 tons of finished sheetmetal parts from offal which normally would have been scrapped. Another plant puts all its scrap in special bins, and material requisitions for small pieces are cleared through this special stockroom.

To prove the effectiveness of the plan: There's been much less interchange between plants than we expected. Most plants have found ways to use their own sheetmetal scrap.

2 SALVAGE OF CARBIDE TIPS ON TOOLS • We have suggested that each plant salvage the carbide tips from worn-out or broken tools. The memo included methods of doing the job: (1) by using induction brazing equipment and removing one tip at a time, (2) by using a high-temperature furnace to bring a batch of tools up to heat and then knocking the carbide off. We included a list of buyers of carbide scrap, with their quotations: up to $2.50 a pound.

No figures on results are available yet, but we know they'll be good. During the last war, one of our works discarded 1200 pounds of worn-out and broken carbide tips in six months. There was no salvage value to this material then.

3 SALVAGE OF SCALE FROM FORGING OPERATIONS · On Oct. 31, 1951, we suggested that all plants not collecting and selling forging scale begin to do so. About 3% of all steel allocated for forgings becomes scale during the process. The value of this scale varies with the locality: One of our plants sells it for $21 a ton. A more usual figure is $9.50. We estimate that our tractor works will produce about 2100 gross tons of scale this year, our automotive plants about 3400 gross tons, our implement plants at least 3400 tons.

4 INTERCHANGE OF TOOLS BETWEEN WORKS · We sent to our plants a memo which read in part: "The interchange of new and used perishable tools between works offers considerable cost reduction possibilities. There are many tools which have been used as much as possible on the job for which they were purchased but which have considerable useful life left. It is believed that many, if not all, can be used by the various works of the company, either in their present condition or by slight modification."

We have a man whose job it is to travel from plant to plant with a sample case of tools (right). The case contains samples of the non-standard tools available. He has an up-to-date list of other tools, too. These tools are made available to any plant that can use them, without charge, except for freight costs. In four years our savings from this program have been $297,200.

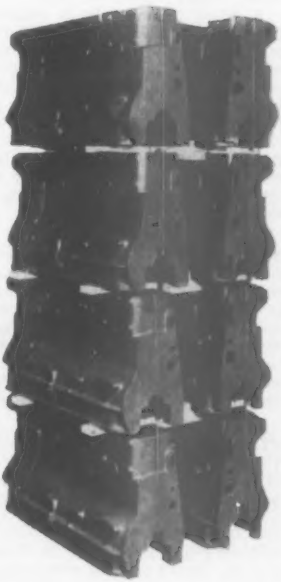
5 USING WIRE INSTEAD OF FLAT BANDS wherever possible. Wire of comparable strength requires 15% less steel. And the salvage of band and wire makes sense. This can be done by removing the seal or knot and straightening the remainder. These short lengths can almost always be used.

6 SALVAGE ANY LUMBER that enters the plant. Takes a little more time and care in opening crates, but in the first six months of this year our Springfield, Ill., works reported saving $21,850. Our East Moline, Ill., works salvages about 50,000 board feet annually. It's just as good as new lumber for in-plant use and for shipping.

And don't scoff at the re-use of cartons, cushioning materials, etc. Many of our plants use this material many times, then bundle it and sell it as waste paper.

7 REDUCE THE THICKNESS OF LUMBER used in pallets, crates, and other items wherever possible. If you can cut down from ¾-in. to ⅝-in. lumber in pallets, that's a 12½% saving. Take a quick look, and you'll probably find several places where you're using lumber that's heavier than necessary.

8 DE-PALLETIZE · It will save a lot of shipping material, and also cut shipping costs by reducing tare weight. We're pushing hard on making up unitloads without pallets or dunnage. The castings (right) are a sample of the kind of load that lends itself to de-palletizing.



9 REPLACE HEAVY SHEATHED CRATES with wirebound crates if possible. As an example, the tractor plant has replaced a ⅝-in. sheathed crate with a ⅜-in. wirebound crate made of resawed material. To carry this idea further, our West Pullman, Ill., works has made a 15% reduction in lumber requirements by switching to corrugated cartons for shipping nuts and bolts.

10 ELIMINATE CRATING ENTIRELY if you can. One of our plants has done it. The track rollers shipped from the tractor works used to be crated in wirebound boxes. Realizing that only a few delicate parts had to be protected, they substituted spiral-wound paper tubes over these parts for the crate.

Wage Stabilization has made them almost a "must."
Here are facts you need to know about

JOB EVALUATION PLANS

The Four Kinds...

POINT PLANS. The point method of evaluation uses a series of factors or traits to measure jobs, such as *experience, working conditions, complexity of work, and hazards,* to name a few.

Each factor is then subdivided into degrees, and the degrees are assigned numerical values (points). In evaluating a job, the idea is to select that degree of each factor that most closely fits the job. Then the point values for all the degrees that have been decided on are added up to give the total point value for the job. This value can be converted into dollars and cents through a conversion table.

FACTOR COMPARISON PLANS. The factor comparison method also uses factors—from three to five, usually. But there are no degrees, as in the point method. Typical factors are: *responsibility, working conditions, skill* — really broad aspects of jobs.

A group of key jobs is ranked for each factor, the basis of ranking being the importance of the factor in determining the worth of the job. The ranking is done by committee. The wage or salary paid for each key job is then split up among the factors, based on committee judgment. After repeated rankings, on a cut-and-try basis, scales are developed against which the balance of the jobs can be priced. Points may be used instead of direct dollars-and-cents figures, if desired.

RANKING PLANS. Ranking merely involves lining up jobs in their assumed rank order of importance. The big trouble is that it is hard to justify the exact rank order of each job. Even more important, the amounts of the differences between the ranked jobs can't be measured. Ranking only shows the *order* of importance of jobs, not the *differences* between them.

CLASSIFICATION PLANS. Classification involves sorting jobs into groups or classes. The classes may be given labels, or merely numbers. The simplest case might be the company that sets up 10 classes, putting the simplest jobs into number 1, and the most complex and difficult jobs into number 10. The remaining jobs are sorted into the remaining eight slots.

The system is simple and easy to understand. But it has the same basic weaknesses as the ranking system. For that reason, it's not widely used.

...and a Picture of Prevailing

It will guide you in setting up a new job evaluation plan. It will help you size up and improve an existing plan.

This is the kind of practical information you need these days. Wage and salary controls make it increasingly important to set your pay practice on a sound base, so you can defend what you're doing—or what you want to do.

By R. C. SMYTH
Ebasco Services, Inc., New York

A sound job evaluation plan is the most orderly and defensible method we have yet found for deciding what jobs are worth in relation to one another. Of the four methods of evaluation (see left), the point method is commonly believed to be by far the most widely used in industry today. Despite this, no company can afford to adopt a point plan unquestioningly. Nor can it risk "borrowing" some other company's plan and using it as is without careful analysis to be sure it fits local needs.

How can a company decide what fits and what doesn't? Are point job evaluation plans actually as popular as they are said to be? What about higher level jobs? Can you use point plans for them too? How many "factors" should be used? Into how many degrees should each factor be subdivided? What relative weights should be given to the different factors? In fact, what about the factors themselves? Which ones should be used?

These are the difficult, practical questions that immediately come up when you consider setting up a point job evaluation plan. They *must* be answered eventually.

The problem is how to get the answers without costly trial and error. Published literature contains many helpful guiding principles. But unfortunately it does not give much help on the specific *practices* of companies that have had successful point plans in use.

So we made a survey to fill the gap between principle and practice. Its aim is simply to analyze the basic elements of structure and content that are

Practice in Industry

typical of successful point job evaluation plans. Difficult decisions will still have to be made to meet the special needs of each plant. But, with the yardstick of typical industrial practice as a guide, those decisions can be made more confidently and more intelligently.

A word about the survey: The 72 companies that participated submitted copies of all the job evaluation plans they were using, plus related information on their wage policies. The survey results are therefore based on first-hand examinations of the plans.

NUMBER OF EMPLOYEES	NUMBER OF COMPANIES
100 — 500	7
501 — 1,000	11
1,001 — 3,000	15
3,001 — 5,000	10
5,001 — 10,000	12
10,001 — 20,000	11
20,001 — 43,000	6
TOTAL	72

METHOD	NUMBER OF COMPANIES USING	% OF TOTAL
POINT	91	81.2%
FACTOR COMPARISON	15	13.4
RANKING OR CLASSIFICATION	6	5.4
TOTAL	112	100.0

NUMBER AND SIZE OF COMPANIES . . .

The 72 companies covered by the survey reported they were using a total of 112 job evaluation plans of *all* types. This amounts to about 1½ plans per company. The reason for this is that many companies used different plans for different groups of workers—manual and clerical, for example.

Better than four out of five of the 112 plans submitted used the point method to evaluate jobs.

AND THE PLANS THEY USE

Much of the credit for the great popularity of point plans must go to the National Electrical Manufacturers Association. The "NEMA plan" for manual jobs was one of the first really effective point plans to be developed. This plan is still widely used by NEMA, as well as by the National Metal Trades Association. One third of all the point plans analyzed in this survey were NEMA or NMTA plans.

To see how 72 companies use the point plan, turn the page →

Begins on page 118

HOW 72 COMPANIES ARE USING POINT PLANS

TYPES OF JOBS COVERED

Can you use point plans successfully for all types of jobs in a plant—higher-level jobs, for example? This is an important question because some authorities have argued that point plans can be used best for manual and lower-level clerical jobs. As a result, some companies have hesitated to try the point method for evaluating supervisory, administrative, professional, and technical jobs.

The survey results suggest there is no practical basis for the belief that a point plan will not work for higher-level jobs. It is now being used in 7 out of every 10 cases. The breakdown:

JOB	TYPE OF PLAN	NUMBER OF COMPANIES USING	% OF TOTAL
MANUAL	POINT	50	89%
	FACTOR COMPARISON	5	9
	RANKING OR CLASSIFICATION	1	2
	TOTAL	56	100%
CLERICAL	POINT	25	74%
	FACTOR COMPARISON	7	20
	RANKING OR CLASSIFICATION	2	6
	TOTAL	34	100%
HIGHER LEVEL	POINT	16	72%
	FACTOR COMPARISON	3	14
	RANKING OR CLASSIFICATION	3	14
	TOTAL	22	100%

FACTORS COMMONLY USED

Perhaps the biggest problem—and certainly the earliest—is the question of what basic factors to use in a point plan. This is a problem even when you may be using a ready-made plan, because you may want to modify it to suit unusual local conditions.

The frequency with which various factors are currently used should be a helpful guide to any company that is faced with the task of installing or revising a point plan. Here are all factors that were used more than once by the companies covered in the survey:

FACTOR	FREQUENCY OF USE (% of plans)		
	50 MANUAL PLANS	25 CLERICAL PLANS	16 HIGHER-LEVEL PLANS
Physical effort	108%*	56%	38%
Accident and health hazards	98		
Education	96	100	100
Working conditions	96	88	88
Experience	90	104*	112*
Responsibility for material or product	86		
Mental or visual effort	84	68	63
Responsibility for safety of others	76		
Responsibility for equipment or tools	74		
Initiative and/or ingenuity	72	108*	88
Responsibility for work of others	70	8	
Skill	28	8	
Responsibility for contacts with others	14	92	94
Responsibility for preventing errors	12	56	56
Complexity of duties	10	52	69
Monetary responsibility	8	40	38
Judgment	6	12	19
Personal expense involved	4		
Responsibility for operations	4		
Responsibility for confidential data		40	56
Tact		8	
Decisions affecting cost control		8	
Number of employees supervised			69
Type and level of supervision			69

*Some plans used the same basic factor more than once under different labels. The factor was counted each time. This accounts for percentages in excess of 100%.

FOR JOB EVALUATION

NUMBER OF FACTORS USED

Basically, there is no "right" or "wrong" number of factors for any evaluation plan. Plans with very few factors work, as do some with many factors. The companies surveyed, for example, used as few as six, and as many as 24 in one case. Here is the breakdown for the "average" plan, to give you an idea of general practice:

	MANUAL	CLERICAL	HIGHER LEVEL
AVERAGE NO. OF FACTORS IN PLAN	11	10	11

NUMBER OF "DEGREES" PER FACTOR

Common practice is to evaluate jobs by picking that "degree" of a factor that most closely fits the job being evaluated. The number of points assigned to that degree is then added to the total points for the other factors (determined in the same way). The total points are then converted to a money scale for job-pricing purposes.

For example: The job of janitor normally gets the first degree on the factor of education. This degree might be described as "work requires ability to read and write—equivalent to grammar school education." The job of toolmaker, on the other hand, might be described as requiring the equivalent of high school education plus specialized trades training over several years. This would be a much higher "degree" than that of janitor.

The practical problem is: How many degrees are needed to cover the wide range of different jobs in a plant? There is no standard answer to this question, for obvious reasons. But survey results show that in practice a relatively small number of degrees is preferred for each factor. The breakdown:

	MANUAL	CLERICAL	HIGHER LEVEL
AVERAGE NO. OF DEGREES IN FACTOR	5	5	6

In only 12 plans did the companies try to use more than six degrees for a given factor. In most such cases the degrees were simply units of scales made up of sequences of numbers—such as numbers of people supervised, lengths of time, or dollar values.

RELATIVE "WEIGHTS" OF FACTORS

The factors used in point job evaluation plans are not all equally important. "Experience" or "skill," for example, is more important in deciding what a job is worth than is the physical effort the job demands. Both kinds of factors must be considered, of course, because jobs differ from one another in both. But the more important factors have to be weighted more heavily or the jobs will not evaluate properly in relation to one another.

All the factors used in point plans fall into four broad "classes." It is not possible to show how the companies surveyed weighted each individual factor. But the general practice in weighting can be shown for each of these broad classes:

Skill factors, such as experience, initiative, ingenuity, education, complexity.

Effort factors, such as mental effort, visual demand, physical effort, concentration.

Responsibility factors, for such items as tools, equipment, material, confidential data, reports and records, money, safety of others.

Job condition factors, such as working conditions, accident hazards, health hazards, clothing damage.

Here is the breakdown for these classes of factors, showing relative importance of each as a fractional part of 100%:

FACTOR	MANUAL	CLERICAL	HIGHER LEVEL
SKILL	50%	62%	65%
EFFORT	15%	7%	5%
RESPONSIBILITY	20%	27%	27%
JOB CONDITIONS	15%	4%	3%

It is clear that effort and job condition factors are of only minor importance for clerical and higher-level jobs. The great weight is on skill, with responsibility less than half as important.

WHY OUR MAN-HOUR

Output Climbed 2½ Times Since World War II

By HOWARD G. ENGLER
Superintendent of Fabrication
Ryan Aeronautical Company, San Diego, Calif.

Here's the productivity record of Ryan's hammer forming department:

World War II: 3.8 parts per man-hour

6 months ago: 7.0 parts per man-hour

Today: 9.5 parts per man-hour

Here are the reasons:

1. **Better supervision**
2. **Better methods**
3. **Better planning**

All three are important. They're interlocked. I don't believe any one would have done as much without the other two—unless it's better supervision.

LATEST PRODUCTIVITY REPORTS show our hammer forming department is producing about 9.5 parts per man-hour. That's 2½ times the output Ryan considered good during World War II. It's a third better than it was just six months ago.

We make exhaust system components in a variety of shapes and sizes. You may think parts-per-man-hour is a poor unit of measurement because of variations. But it's a pretty good yardstick for us. Every part goes through the same processes, needs practically the same number of man-hours of work.

This jump in productivity started me thinking—thinking about what's happened in the department during those years. Looking back, I can see there have been a lot of changes. But the changes came one by one—a steady pace of improvement. And they're still coming.

These changes for the better seem to break down into three types. Here's what happened:

BETTER SUPERVISION

Hammer forming is difficult work. It requires high individual skills and experience, imposes tough working conditions. The men work with heavy machines and dies and molten lead. They exert a lot of physical effort all the time. The work must be done in an area where 14 big hammers jar the earth. Noise and vibration are bad. It's work that especially tests supervision; it requires closest attention to morale factors.

After the war we started a program to build morale in this department—with better supervision. We're convinced that supervision is the keystone of any morale-building program.

First, we got the right type of supervisors. Some we already had, some we had to get. We figured the most important thing was to get the men who had a natural grasp of human relations principles. It seems to me this is as much an emotional quality of a man's nature as it is an acquired characteristic.

Then a supervisor talked with each of the employees to find out how he felt about his job. It wasn't easy to get frank responses, especially in the beginning. But, over a period of months, we convinced the men we were sincere—by action.

Many morale factors are intangible, hard to put your finger on. Often it's just the way a supervisor handles the daily happenings and contacts, which individually seem unimportant. But they add up to a mighty total of employee attitude.

We found some employees didn't like the work and wanted to transfer to other departments. We helped them to make the switch.

Others wanted to stay in hammer work, but were dissatisfied because of some relatively minor circumstance. Attention and consideration given them in interviews straightened these out. They've stayed, and are now doing an excellent job.

To prove I'm not just "talking" about transfers let me cite you an actual case:

In one interview we learned a man wasn't interested in hammer work. He had long wanted to work in tool design but didn't have the required knowledge. We knew this man was sincere. He had the ability to learn.

His foreman borrowed some books on tool design for this man to study. When some of the mathematics stumped the student, the foreman coached him. Finally, the employee had learned enough to qualify for a job in the Ryan tool-planning department—where he's doing outstanding work. Although this case is unusual, it shows we mean what we say about helping a man get a transfer if he wants it.

Transferring employees to more suitable work is not a revolutionary idea. But you'd be surprised to find how few supervisors really believe in doing it. Transfers make extra work for supervisors in replacing employees who have acquired some degree of skill. Many supervisors feel transfers are a reflection upon them, try to discourage transfers. In a good many plants employees are afraid to ask for transfers.

We've learned that making transfers a real opportunity to the employee is worth every bit of extra effort it takes. Here's what I mean:

1. The company gets the benefit of having people on the right jobs.

2. When employees know they are free to move out of the department, they feel much better about staying.

3. Job attitude improves when employees realize their supervisors are really interested in them as individuals.

Here's a trick we used to avoid bringing in new employees who'll be dissatisfied with the work. The foreman interviews all prospective employees. He paints the work and working conditions a little blacker than they actually are. We don't have disillusioned new employees. They find the job a little better than they expected.

In the department, the employees have only one boss—the assistant foreman. All instructions are transmitted through him. The foreman and superintendent discuss work with the men, but never give them direct orders. This one simple practice helped boost productive morale.

BETTER METHODS

We get ideas for better methods from employees in the department, from others in the company, and from outside the company.

The way we started department employees suggesting ideas was to ask their advice on making parts we hadn't made before. After all, these men knew a lot about hammer operations. Consultation gave them a chance to help plan production methods. It stimulated their interest—and imagination. And we got practical advice we could use.

After we had been doing this for awhile the men began to suggest ways to improve shop operations on their own initiative—despite the fact we don't have a formal suggestion system. But the men get satisfaction from seeing their ideas adopted.

Sometimes an employee—usually a newer one—comes up with an idea that's impractical. We carefully explain to him why it won't work, spending as much time as necessary to make him understand. For us it's an opportunity to give him more job knowledge, and to convince him that his suggestions get full consideration.

BETTER PLANNING

Better planning of our work is a major factor in the productivity increase. Like methods, it's tied in with morale. Better planning gives the worker a clearer picture of his task and increases the stature of supervision in his estimate.

The planning is centralized in a system of schedules that tell us how much work we're doing, and the location of shop orders.

We receive a "schedule of parts to be made" form from the production control department each week. It shows us what's to be made during the next 12 months. It's revised weekly. The day foreman uses this schedule to determine manpower and machine requirements, arrange vacations, and make other long-range plans.

The foreman checks the schedule for orders for duplicate and similar parts which could be consolidated to save setup time.

To translate the long-range schedule into daily operations the day foreman designed a "work progress" form. It shows where each order stands, details location and timing of an average of 40 parts and 40,000 pieces in process at any given time. A "control" sheet turned in daily by the assistant foreman furnishes the information to keep the "work progress" sheet up to date.

The objective of our planning is optimum utilization of machines and skilled operators for productive work. Toward this end we do two things:

1. We arrange the detailed production schedule to try to keep all but one hammer producing at all times. That keeps operators and setup men busy at their specialized skills.

2. We relieve operators of all the auxiliary tasks that we can, leaving them free to concentrate on running the machines to produce.

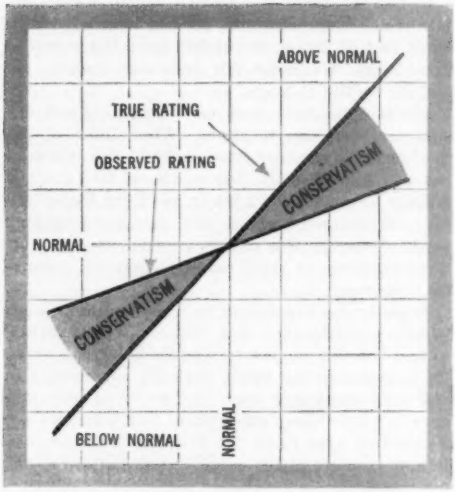
We designate various employees to perform the auxiliary jobs, fix responsibilities to make certain everything is done when it should be done. For instance, setup men change dies, parts handlers keep material moving, planish operators hammer out minor wrinkles left in some pieces.

Incidently, planishing is a very noisy job. So we employ deaf persons for this work, have found it a successful solution of the problem.

Now, with good supervision, ideas coming in, and continued attention to planning, we hope to keep our productivity going up.

Time study results are not right if the time study man doesn't judge working pace accurately. Maybe your time study men can rate normal pace on the button every time. But workers usually don't work at normal. How well can your raters say how much above or below normal they're working?

General Foods found out — found its well-trained engineers were OK on normal, but off on speeds faster and slower. Here's how this company tested its time study men, *and corrected them.*



WHAT "CONSERVATISM" IS • Time study men actually rated normal working speed correctly. But when workers performed at speeds above and below normal, ratings were lower for faster pace, higher for slower pace. The error is "conservatism."

Here's how to

Improve Your Time Study Rating

By S. M. DIX • Industrial Engineer
General Foods Corporation
New York

MAYBE YOUR TIME STUDY MEN can rate normal working pace on the button. We found ours did it, too. Maybe yours will agree on what's above, what's below normal. So did ours. But do they agree on *how much* above or below normal a man is working during a time study? We found ours did not always agree.

The normal operator may be easy to recognize, but he is not so easy to find. You probably take your time studies, as most do, on the operators doing the job. A few workers may work at normal during the study. Most will work above or below normal.

It's important to us that the concept of workers' performance is consistent among all plants, and departments within the plants. General Foods Corporation operates plants spread all across this country and beyond. But whether you have many plants or just one plant, your problem is the same if you have two or more time study men.

The accuracy of standards developed from time studies will depend upon ratings above and below as well as at normal.

For that reason, we have always paid close attention to the training of our time study men in performance rating. We have checked the rating ability of our personnel with films of several operations performed at different speeds. We used the films developed by the Society for Advancement of Management which show 24 operations rated by some 1800 time study men. You might use this or some other means of comparing your test ratings with established values. The *average* rating of all our time study men was only 1% off the average true rating of the 24 operations. On individual operations they were within 5%.

But we weren't satisfied to stop there. We checked the ratings of each man on each test rating. We wanted to see if any plant, any individuals, needed extra training attention on normal pace.

LOOK FOR A "CONSERVATISM" FACTOR

We analyzed the ratings of speeds above and below normal for a factor called "conservatism." It's the tendency of time study men to underrate fast performance and over-rate slow performance. They hedge in the direction of normal. They are too "conservative."

We found our time study men were not excep-

	OPERATION	OBSERVED RATE (INDEX BASE = 60)		TRUE RATE		OBSERVED × TRUE RATE
	1	85	×	89	=	7565
	2	55	×	50	=	2750
	3	80	×	86	=	6880
	4	65	×	67	=	4355
	5	70	×	73	=	5110
ADD		355		365		26,660
SUBTRACT	Total observed rates × average of true rates (355 × 73.0)					25,915
						745
DIVIDE BY	Sum of square of true rates					
	− average of true rates × total of true rates. (27,635 − 26,645)					990
						0.75
SUBTRACT	from 1.00 to get Index of Conservatism (1.00 − 0.75)					0.25

HOW TO CALCULATE "CONSERVATISM" • **Follow the steps shown in this example for one test. The test consists of a single operation performed at five different speeds, for which the true rates are known. With a calculator and standard form you can find the index of conservatism in a test in three minutes. You can test your time study men in groups, but let each record his own observed ratings. Give them as many representative tests as necessary to indicate a trend.**

–Above and Below Normal

tional. Their ratings of the operations at normal pace agreed very closely with the true ratings. Their ratings above and below normal were proportional to each other. But their ratings above and below normal were conservative when compared with the true ratings.

CORRECT "CONSERVATISM" IN THIS WAY

First we figured a way to measure the degree of this type of error. We call it "index of conservatism." It's simply a relation of the difference between true and observed ratings with the difference between true and normal ratings. Anyone can calculate the averages.

We calculated the index of conservatism of each time study man, and found an average for each plant. We told each man how much he had to change to get on the beam. Then we followed up with another test to see how well each corrected his rating. Most improved immediately. They needed only to be told how much they were off. Those who needed it received additional drilling in rating.

We re-tested everyone every three months. We reported results of the tests to our interested management people and the time study men. The average index of conservatism has dropped from a figure of approximately 0.5 to 0.2. That means our time study data is more accurate.

HOW TO FIND YOUR "INDEX OF CONSERVATISM"

Here's how we measure the relative conservatism of our time study men:

We test our time study men with a film showing five different speeds on each of several operations. The showing of the different operations and speeds is mixed to make rating more realistic.

We've found the observed ratings of a time study man fall pretty close to a straight line that passes through normal. It intersects the straight line representing true ratings at normal.

We can measure the error (conservatism) as the difference between the slope of this line and the straight line representing true ratings. The slope of the true rating line is 1.00 (because it's necessarily at an angle of 45 degrees). The slope of the observed rating line is easily found by the method of least squares. When you subtract this slope from 1.00, you get what we call the index of conservatism.

TIPS TO GOOD HUMAN RELATIONS for factory executives

By M. J. MURPHY • Industrial Relations Editor, FACTORY

NEW PHOTOQUIZ ADDS MAGAZINE INTEREST

Looking for new ways to get interest in your employee magazine — and to get more employees in it? If so, you'll be interested in the ingenious photoquiz approach used by Inland Steel Company in its magazine, *Inland News*.

Inland gives a double-page spread to pictures of employees' faces (on left page), and the same employees' hands (on right page). Hands are shown performing some job typical of the employees' work. Trick is to match faces with hands.

Patterned after well-known magazine techniques (notably *Look* and *Life*), this approach is a sure interest-arouser. Good change of pace in the average plant magazine, too.

EMPLOYEES EDIT THEIR OWN MAGAZINE

It may not work everywhere, but here's one way out of many employee magazine headaches: Let 'em edit, publish, and run the whole thing themselves. Won't work? Yes, it will—and does, at Lewyt Corporation, Brooklyn, N. Y.

Lewyt has a simple system: Once a year it meets with the *Lewyt Reflector's* editor and his staff, all of whom have been elected by their fellow workers. The company tells the staff how much money it has budgeted for the magazine for the coming year, and reviews three simple rules: Nothing pornographic, nothing politically controversial, nothing false.

The company's policy is strictly hands off. It even reserves space at major outside functions for *Reflector* staff members, just like any other representatives of the press.

Cost, out of pocket, this year is $211 a month, or just about two cents per employee. This does not include company time editor uses to put the magazine together. Lewyt has no estimates of this cost, except to say that the editor does his regular job with no apparent bad effects of any sort.

WHAT YOU GET OUT OF PLANNED SAFETY PROGRAMS

The National Safety Council reports a new all-time low in all-industry safety records for the year 1950. Accident frequency and severity rates were 8% lower than for 1949. The N. S. C. —never a boastful organization—quietly adds to this good news a comment that shows clearly the advantages of being part of an *organized* drive to promote safety. Here's the comment—

"A recent study revealed that the accident rates of non-member industrial plants average 70% higher than the rates of [National Safety] Council members."

REPORT ON COUPON IN HELP-WANTED AD

Everybody else seems to use clip-out coupons in advertising. So why not use them in help-wanted advertising in newspapers? Here's the answer by one company that tried the coupon method—Harris-Seybold Company, Cleveland.

Advertisements containing coupons (which applicants clipped and sent in with their names and addresses) pulled good numbers of responses, the company reports. Every applicant got by return mail a copy of the company maga-

zine, an application blank, a letter telling the kinds of skills needed, and a return envelope. About one person in four responded after receiving this package.

But here's the rub. Those who sent in applications generally weren't the kinds of people the company needed or could use.

Tentative conclusion is that you're better off to pin-point the precise jobs you want to fill, and dispense with the coupon. For example, a 3-line ad of the pin-point type called for male typists. Result, two qualified men were hired right away.

"ECONOMICS OF BUSINESS" CLOSE TO HOME

One way to get employees to understand business economics is pretty simple. It's to tell 'em *news*—plain and unvarnished. Here's a good example, as practiced by the Carpet Division of Alexander Smith, Inc., Yonkers, N. Y. In its employee magazine, *The News*, the company has a single page titled "News of the Industry." In it, quick thumbnail sketches outline the highlights of what's happening.

In the September issue, for instance, the company tells about reduction of prices by cotton rug mills, sales by home furnishing retailers. In addition, news of a new plant by a major competitor—with no editorial comment—makes a stronger point than many words of explanation of the importance of competition.

HOW TO PREVENT NOISE DEAFNESS

If you have a noisy plant (where noise level is over 90 decibels) you'll help yourself and your employees by taking a simple preventive step. The step is merely to make sure employees get a pre-employment hearing checkup, followed by another checkup two months later.

Reason: Some workers are highly susceptible to noise and become deaf as a result. Others seem not to be bothered. You can't tell which workers are susceptible without the checkups. Danger is that noise deafness is permanent.

You can't just ignore noise in plants any more, warns Dr. George E. Shambaugh, Jr., hearing expert of Northwestern University. Unions in the past couple of years have caught on to the fact that occupational hearing damage is covered by Workmen's Compensation laws in many states. "The rapid increase in claims is stimulating industry to face the problem of noise deafness squarely, and to take concrete steps to prevent it," Dr. Shambaugh concludes.

He suggests improved design of equipment and use of sound-absorbent materials as ways to lessen noise. But he also warns: "Spot workers with noise-sensitive ears and transfer them to quieter locations."

SUGGESTION PLANS CAN HELP STEEL SCRAP DRIVE

Here's a good way for you to do a better job in helping beat the still-serious shortage of scrap steel: Tie your suggestion plan into a local plant drive to salvage steel scrap. Let employees submit ideas on sources of scrap on ordinary suggestion blanks. You can pay regular awards, based on prices received for scrap, or you can offer separate prizes of nominal amounts.

If many participate, you might also try the scheme of paying the foremen 10% of any awards earned by the employees he supervises.

Sounds like too much fuss? Not so. There's very little that's "too much" fuss when you have a scrap steel shortage as bad as the current one. Everybody's job is to beat it any way we can.

RELIGION IN INDUSTRY

If you're a staunch believer in the philosophy that religion and the shop should be kept separate, you may be surprised at the recent rapid spread of religion in industry. Here's what the National Association of Manufacturers reports, in its excellent release *Exchange*, a monthly newsletter on community relations technique.

Forty or more companies have appointed industrial chaplains, reports the NAM, since the LeTourneau Company of Georgia did what may be the pioneering job about 10 years ago.

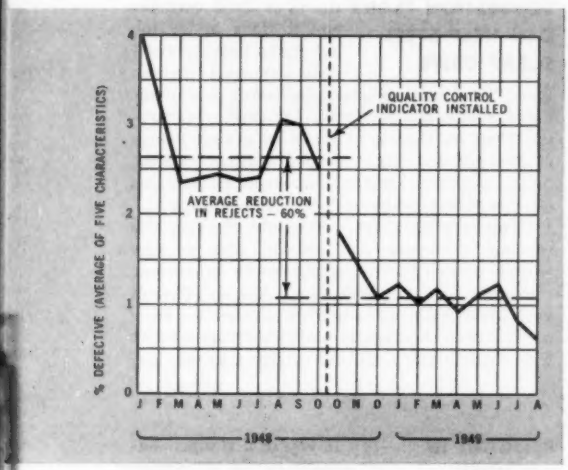
In addition, says the NAM:

"A number of companies have found voluntary on-the-job religious services popular among employees. From 80% to 90% of the Indianapolis Glove Company's several hundred employees jam the social room for a 25-minute service at noon each Wednesday. The Link-Belt Company's Ewart Works in Indianapolis has 'standing room only' at its regular lunch-hour services. In Rochester, more than 300 Roman Catholic employees of Timely Clothes gather around a small altar every noon, while their Protestant and Jewish co-workers stand or sit in respectful silence at near-by machines."

Gerber Plumbing Fixtures Company's wire-bound crate division in Plymouth, Ind., also has regular half-hour services once a week, reports all of its 100-odd employees attend. Services are inter-denominational, to avoid obvious problems. Gerber feels the plan has improved production and employee-management relations.

If you're looking for more production, with lower costs and a minimum of scrap along the way, then consider that...

Quality Control


% DEFECTIVE (AVERAGE OF FIVE CHARACTERISTICS)
4
3
2
1
0
QUALITY CONTROL INDICATOR INSTALLED
AVERAGE REDUCTION IN REJECTS – 60%
J F M A M J J A S O O N D J F M A M J J A
1948
1949

Rejects are lower with this program

QUALITY CONTROL INDICATORS were installed at General Electric's Erie, Pa., refrigerator plant in mid-October 1949. Five characteristics were controlled. Almost immediately rejects dropped (see chart). They continued downhill until stabilized at the process average—about December.

Now, rejects are down 60%. It took fast relay of production-rejection information and fast corrective action on the part of management to get this drop in rejects.

The program will work for you, too

Here's what such a program will do for you:

1. Reduce your losses due to defects, rework, and scrap.
2. Spot where these losses occur and bring them to your attention fast.
3. Coordinate your manufacturing and engineering groups to develop better methods of control to reduce waste.
4. Get employees to produce better materials.

One drawback to many quality control programs is time. You have to collect the data . . . plot it on curves . . . analyze the curves . . . notify manufacturing of the defects and the probable cause. There's a lot of time between cause and correction. It's a short time when you use quality control indicators.

PUSH A BUTTON AT THE INSPECTOR'S BENCH . . . **Inspector just pushes a button to record a reject at the General Electric Somersworth, N. H., plant. Labels on the box indicate various reject causes.**

You can get your data quickly

YOU CAN GET an instrument that will give you—automatically and continuously—the information you're now plotting on your quality control charts.

It consists of an analyzer that analyzes the reject-production ratio each time a reject occurs, and a

How to apply the indicator to

Remember, the indicator is a tool. Like every other tool, it must be used properly or it's of little value. How useful it is depends on the people who use it.

The success of any quality control program depends largely upon the people who apply it. Don't get the idea that installing the indicator will automatically solve all the quality control problems in your plant.

Your inspectors must be instructed in the indicator's use *and value*. When the quality meter shows red, corrective action must be taken immediately. This is one of the primary benefits of the indicator. If corrective action is delayed, the purpose of the indicator is defeated.

Indicators Cut Rejects—Fast

. . . AND THE PRODUCTION MANAGER SEES UP-TO-THE-SECOND QUALITY LEVEL

The production manager can keep track of reject characteristics with a bank of indicators along his office wall. If the indicator needle reads green, reject-production ratio is OK. If the needle moves into the red, rejects are too high. The production department must take fast action to stop them.

and accurately now

meter that shows you immediately when the upper control limit is exceeded.

The instrument is General Electric's quality control indicator. It was described in the March 1950 issue of FACTORY, page 130. Since that time, GE plants themselves have had a lot of experience in the use of the indicator.

Here are just a few pointers on its use. They should make the indicator a more valuable tool for you in your quality control program.

your best advantage

In the indicator you have a tool that eliminates the time delay in reporting quality troubles. You can use that time to take steps to correct the trouble. Then watch your scrap record go down.

In general, it's necessary that inspection and the operation of the quality control indicator take place as close as possible to actual production. The time lag between production and inspection should be less than an hour—only a matter of minutes, if possible. In this way, when the quality control indicator moves into the red, a supervisor can check immediately the cause of high reject levels and the corrective action.

It may be necessary to rearrange inspection stations so that they can be close to production. But it's worth it.

Usually, the quality control indicator is used with 100% inspection. In that case, and with present equipment, the rate of production is limited to about 2000 to 3000 units per 8-hour shift. Where the rate of production is higher, it is possible to use a sampling plan and still use the quality control indicator. However, at these higher rates, each application should be considered individually.

It's possible to fit the quality control indicator into many quality control programs. Many smaller manufacturers can easily adapt the indicator to their inspection techniques. For instance, in the

wire-making industry, it would be possible to check on quality of insulation being applied to the wire. The indicator could be hooked up to the sparking unit which checks the insulation.

In the woolen industry, cloth inspectors could use the indicator to check the quality of the cloth and detect loom trouble or bad wool threads. With these applications, a predetermined counting rate is fed in proportion to the speed of the cloth or wire and the defects are recorded.

Sub-assembly lines are ideal because the manufacturing cycle is usually short. An abnormal number of defects can be traced quickly and the source of trouble eliminated.

How to install the indicator in your plant

How you install the indicator in your plant will vary with the nature and number of characteristics you want to control.

You usually have one totalizer for each production line and one characteristic analyzer for each quality characteristic to be controlled. One totalizer can be used with from one to 10 characteristic analyzers. Where more than 10 are needed, then you need a totalizer for each 10 characteristics.

In the ideal setup, the count of production is supplied to the totalizer by a set of contacts which close automatically each time a part or an assembly enters an inspection station. These contacts can be closed either by a photo-electric relay or a mechanical arrangement using limit switches.

At each inspection station, there is a series of pushbuttons labeled according to characteristics to be checked. Each time the inspector finds a reject, he pushes the appropriate button. Snap action switches are employed where manual counting is used. This eliminates the possibility of the inspector making a double count.

The pushbuttons or switches are connected to the analyzer and totalizer by light-gage wiring. The pushbutton station, analyzers, and totalizers should have plug jacks on the equipment so they can be disconnected easily and moved if necessary.

Location of the analyzer is very important. It should be placed so it is easily seen by the persons assigned to the control program. In addition, a duplicate analyzer can be installed in the chief inspector's office or in the office of the production manager. In this way the people in charge of quality control and production can check from time to time and determine when and what corrective action should be taken.

With some installations, it might be a good idea to put an extra quality meter right at the point of manufacture. It will serve as an incentive to the machine operator to keep rejects down. Again, as in the case of the office unit, the meter is just connected to the analyzer.

There are always a lot of manufacturing bugs to be ironed out when you start making a new product. The quality control indicators will help get those bugs out. And you'll get them out faster than you would without the indicators.

That's why the G-E Somersworth plant (pictures page 128) was a good testing ground for the indicators. They were installed when production started on a new watt-hour meter.

And because the initial installation of indicators was so successful, 20 additional characteristic analyzers have been installed in the plant.

How to operate the system after it's installed

The control of quality is simplified by the use of these indicators. Here's how to operate the system.

Each characteristic analyzer is set to operate by the control knob on the face of the analyzer. Each quality meter shows—continuously—the story for that characteristic. Normally, there's no need for investigation as long as the indicator needle stays within the green portion of the scale. When the needle moves into the red, it calls for immediate action by the production supervisor.

The setting of the quality level is determined by the past performance on the production line. If past performance indicated that the quality levels are about 6%, then the control knob is set for 6%.

However, after a period of operation, if the quality meter stays way up in the green, then you can drop the control point (reduce a 6% defect level to, say, 4% or 5%). At this level certain defects in the manufacturing process may show up which will throw the needle in the red and can then be corrected. Thus the general quality level of the line can be improved with the rejection level considerably reduced.

After the quality control indicator has been in for a while, certain attributes may be reduced to practically zero defects. This is usually the result of changing manufacturing procedure when the quality control indicator warns of excessive defects. When this happens, it is easy to move the characteristic analyzer to another attribute with a higher reject level.

Cash in Your Scrap!

Pumps that are so out of date you can't even sell 'em as second-hand units should be sold for scrap.

Need Help With Your Problems?

IMPORTANT NEW Free CATALOGS

... they're the cream of this month's crop ... they describe latest methods and equipment. Tell us which ones you want. Use the handy coupon at the bottom of the page. If somebody beat you to it, there's another on page 226.

ELECTRICAL EQUIPMENT

1 Conduit Supports
This 77-page catalog shows a complete line of brackets, clamps, and other fittings. Shows how to order and install them, and gives photographs of actual installations. Reference tables, weight and dimension data. Unistrut Products Co.

2 400-Cycle Generators
An 8-page catalog illustrates high-frequency 400-cycle generators. Information on voltage regulation, control panels, and wave shape. Rating-frame-dimension tables. Bogue Electric Manufacturing Co.

3 Voltage Regulators, Variable Transformers
Two catalogs, one 12- and one 15-pager, on automatic voltage regulators and variable transformers. Illustrated, with diagrams and specification charts. Rating tables, price lists. The Superior Electric Co.

4 Contact Pins
If you use contact pins in large quantities, up to ¼ in. diameter and 1½ in. long, this 8-page catalog may help you cut costs. Tells how tubular pins are swaged automatically from flat stock, how you can let the work out by contract. Spec sheets. The Bead Chain Mfg. Co.

PIPELINES & FITTINGS

5 Rubber Sheet Packings
You get 8 pages of illustrations and descriptions of different kinds of packings—pure gum floating stock, Neoprene, red rubber, pure gum stock, black oil-resistant, cloth - inserted, and diaphragm sheet. Specifications and service recommendations. Raybestos-Manhattan, Inc.

6 Flexible Metal Hose
Seamless and strip metal hose and tubing are featured in this 12-page catalog. You'll find tables of engineering data for each type of hose and tubing. There's also a section on couplings for use with the product. The American Brass Co.

7 Compressors
This 50-page catalog shows you how balanced/opposed motor - driven compressors work. Gives 9 pages of actual installation photographs. Cut - away drawings, dimension sheets, parts descriptions, performance data. Clark Bros. Co., Inc.

DUPLICATE COUPON ON PAGE 226

MAIL THIS COUPON FOR FREE CATALOGS *(Good until March 31, 1952)*

FACTORY MANAGEMENT & MAINTENANCE (January, 1952)
330 W. 42nd St., New York 18

I'm circling the numbers of the catalogs and bulletins I want:

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	

Name ..... Title .....

Company .....

Street Address .....

City ..... Zone ..... State .....

OTHER CATALOGS

INSTRUMENTS . . . . . Page 220
MATERIALS HANDLING 220
MECHANICAL EQUIPMENT . . . 224
MISCELLANEOUS 226
PLANT ENGINEERING 228

JOE'S DEPARTMENT FOR BETTER ELECTRICAL SERVICE

By JOE ST. ANDRE • Electrical Editor, FACTORY

How Your Power Company Can Help You With Plant Operating Problems

YOU CERTAINLY SHOULD BE FAMILIAR with some of the many services that alert power companies offer to their industrial customers. For instance, sales engineers to help you in locating your plant, in buying equipment, in solving problems of process engineering, materials handling, lighting, and the like.

Remember that many of the operating jobs and problems in an electric power company are quite similar to those of your own electrical department. Let's take a look at some of them.

1. CONTINUITY OF SERVICE • You spend a lot of money buying equipment and obtaining systems to make sure that power outages will be kept at a minimum in your plant. So does the power company. To you, power outages mean loss of production and money. To a power company, they mean not only public relations headaches but also loss of revenue. When the lights are not burning, the meters are not turning around.

Your power company's field men know all the tricks of the trade when it comes to locating trouble and restoring service in a hurry. Why not see your utility contact man and learn about these short cuts before the same trouble hits your plant?

2. HANDLING HIGH VOLTAGES • As plants and electrical loads have grown, higher voltages have been necessary to carry the large amounts of power required throughout the plant. The unit sub-station made its appearance. To feed these stations 2300- and 4160-volt power began to run around the plant. Then in only a short while, the voltages began to run up to 13,200 and 26,400. Main sub-stations began to take in power at 69,000 and 138,000 volts.

The plant electrician now has to be an electrical engineer dealing with power company problems.

In addition, as the main sub-station grew from a couple of transformers on a pole outside the plant to the large "subs" needed to handle ever-increasing power, the power company gave up maintaining customers' incoming sub-stations. Today, most industrial plants purchase and construct their main sub-stations. They have to maintain them as well.

Taking care of this high-voltage equipment requires know-how not obtained overnight or out of books. Your power company service men have that know-how, based on taking care of similar equipment for many years.

Take the case of large, high-voltage circuit breakers. When you take one of these animals apart for maintenance or in case of trouble, it is nice to know that someone who knows what it's all about is looking over your shoulder.

Your men will never have enough of this type of work to become really familiar with it. Yet it's old stuff to the power company people. They probably have hundreds of items of the same type of equipment. If you want to know about operating experience with circuit breakers, your power company has years of experience to give you.

Another point: A lot of plants today have underground cable distribution systems. The care of cables, manholes, underground ducts, potheads, disconnect switches is commonplace with power company men. Their advice when you have a cable failure can be very valuable in locating trouble and making repairs.

3. SAFETY • Safety in the handling of high-voltage systems cannot be stressed too strongly. Safety rules you set up for your electrical department for use on low-voltage systems will be inadequate for use when handling high voltages.

High voltage doesn't wait for you to touch it. It reaches out for you. Testing for its presence requires new test equipment which must be maintained and stored carefully.

Power company men working on high voltage are never in a hurry. Don't treat their advice lightly. It may seem that they are over-cautious and at times have rules that seem to you ridiculous and even crazy.

But don't forget that you are dealing with a vicious killer. *Your first mistake is usually your last.* It's an education to have a half-hour chat with an old-time lineman or to watch an electrical

operator do a nice switching job in a sub-station.

Get a copy of your power company's safety rules. You will have to adapt them to fit your own particular plant's needs. But in general they will form the basis for your own rules. Some utility companies will loan a safety man or the company will do high-voltage repair and bill you for it.

Invite the safety director of the power company to visit your plant. Show him your distribution system. His experience and advice may save your plant serious accidents and even loss of life.

4. EQUIPMENT FOR REPLACEMENT · It might be well to consult your power company when you buy new equipment for your outdoor sub-stations.

If your equipment is like the power company's, you might be able to borrow from the utility until you can get replacement from the manufacturer.

Of course, I am not advocating your power company as a spare-parts storeroom. But blowups on high-voltage lines are usually big ones. You can't begin to have in your storeroom all the parts needed to replace the wreckage of, say, a lightning hit on your main "sub."

This may work two ways. There are times when the power company people may get into a jam. They will appreciate knowing that if they need an insulator to complete an emergency repair, they can run down to your plant and get one from you to tide them over.

HOW YOU CAN HELP THE POWER COMPANY, TOO

While you may hope to get a great deal of help in your operations from the power company, don't lose sight of the fact that its men are interested in getting operating data from you too. It *should* work both ways.

I recall one incident involving the testing of the main power meter in one of the plants where I was working. Our load dispatcher was losing "kw" demand between our main sub-station and the development laboratory. When the operator at the lab called for a certain amount of power from the load dispatcher and apparently got it, it never seemed to show up correctly on the main demand meter.

We went crazy trying to find the error. We checked and calibrated our own meters over and over again. The power company rechecked its meter—though it always checked regularly anyway. Still the apparent error persisted.

Finally, I asked the power company's people to check their meter a certain way, other than their standard test. They finally agreed to test it my way, probably more to humor me than anything else. But lo and behold! The error showed up in their meter. One of their metering current transformers in our switchyard was found to be shorted. It was the first time such a thing had ever happened. We had been getting power without all of it being registered on the main meter.

Needless to say, the power company's method of testing that meter was radically changed. The point is, here was one instance where the power company learned something from its customer. If we had not called the meter to their attention, the error might have gone on for years. Boy, what a scramble that would have caused.

Another case arose in getting data on switching high-voltage circuits, using horn gap switches. We were continually switching our main sub-station to clear circuits for maintenance work and economy of operation. At times we did more switching than the power company did on its whole system. The data we obtained and gave the power company people was valuable to them as well as to us.

HOW YOU CAN PROMOTE THE EXCHANGE OF INFORMATION

To get close cooperation for the free exchange of information, it will help a lot in having operating men in your plant on close terms with the power company men.

Our load dispatchers were continually in touch with the power company dispatchers. They visited one another so that they knew what the fellow on the other end of the wire looked like.

The power company sent over its new trainees to visit our power system and get to know how we operated. When we started to yell about high voltage, they had a good idea about why we were complaining.

Once a year, some of our key operating men in the electrical department visited with the power company men at some of their installations. A round-table discussion followed an inspection trip. You would be surprised to find out how many problems were common to both groups.

You can get more out of your power company than a power bill once a month. Get to know its people better on the operating levels. You will find them bundles of valuable information—and great men to turn to for help in case of trouble.

Unusable dies **take up storage space. The steel mills need them and scrap dealers will buy them.**

British and German Ideas of

Damage Control in Wartime

IF YOU WANT YOUR PLANT to be a good risk in an A-bomb attack, the time to start planning is right now. That's what the National Industrial Conference Board tells you in its new booklet, reporting British and German wartime experiences. You can get it for $3 from NICB, 247 Park Ave., New York 17.

By planning in advance, European industries greatly minimized plant damage and were able to get back into production fast.

True, these plants were hit by "conventional" bombs —not A-bombs. But A-bombs produce the same kind of destructive effects, only on a larger scale. Most of the damage will result from blast and secondary fires.

European experiences can be a valuable guide to American industries. The British and Germans found many ways to take part of the sting out of blockbusters. Here are some points you should check:

Dispersal of facilities · By all odds this was the best insurance against crippling losses. Many plants rearranged production into two or more integrated units—widely separated and completely independent of each other. One bomb or one raid couldn't knock out the entire operation.

Blast walls · Non-rigid brick or cement-block blast walls, without mortar, provided the best protective screening for buildings, utilities, and machines. The Germans used portable blast walls constructed in inverted V or T shapes.

Protective roofs · Over pieces of equipment, protective roofs prevented damage, even from building collapse.

Building construction · One-story reinforced concrete or steel frame construction was best. Many plants satisfactorily strengthened their buildings by installing transverse supports, adding framing, thickening walls.

Roofing · It was vulnerable to both blast and fire. Most plants either removed their tarred roof coverings or sanded and wet them down with sprinkler systems.

Flying glass · This was a prime hazard for factory workers and equipment. Most plants either removed all glazing or coated it with a bonding agent to prevent shattering.

Uncontrolled fires · They caused more damage than the blast. Good housekeeping was the best bet to minimize fire damage. Regular water mains proved highly vulnerable, so many plants relied on natural water resources, or else scattered water storage tanks throughout their plants.

12 HOURS AFTER BOMBING this English plant appeared to be a total loss.

7 DAYS LATER, thanks to pre-planned measures, production was going on under canvas.

3 MONTHS LATER you couldn't tell the plant had been hit. Production was back to normal.

Exide-Ironclad
BATTERIES
ARE YOUR BEST POWER BUY— AT ANY PRICE

They ASSURE high maneuverability of trucks ... rapid, accurate handling of material ... PROVIDE uniform rate of material handling with no unscheduled down time ... SHOW lowest costs of operation, maintenance, repair, depreciation, inherently safe. Call in an Exide Representative, and let him prove these facts.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto
"Exide-Ironclad" *Reg. Trade-mark U.S. Pat. Off.*

maintenance data sheet 185

Discharge of Water Into the Atmosphere Through Smooth Pipes, Sharp-Edged Orifices, and Valves

Prepared by **CRANE COMPANY,** 836 South Michigan Avenue, Chicago

The quantity of water discharged into the atmosphere through a pipe, orifice, or valve depends upon several variable factors. Most important of these are rate of flow, pressure, size of pipe, condition of pipe-wall surface, length of pipeline, kind of pipe entrance, and type of valve or orifice.

The chart on the following page gives the discharge of water (1) through standard steel pipe in sizes from $\frac{3}{8}$-inch to 10-inch, and in lengths from 1 to 200 feet; (2) through orifices in sizes up to 10-inch; and (3) through valves in sizes up to $2\frac{1}{2}$-inch. These data are based on use of (1) a squared-off, non-projecting pipe entrance, (2) a sharp-edged orifice, and (3) valves that permit one-half of the flow through a short pipe of the same size (as in a typical, well-designed globe valve).

To obtain discharge of water through brass tubes or cast-iron pipe, this chart will be reasonably correct when applied for sizes of the same inside dimensions as standard steel pipe.

In all cases, the pressure used in this chart to determine the flow through pipes, orifices, or valves should be the effective head pressure under flow conditions, not the static pressure in the line before flow commences. This caution applies especially to lines supplied by pumps, and the like. This pressure will be the gage or head pressure at the point of entrance of the measured flow.

EXAMPLE NO. 1—FLOW THROUGH PIPE

Problem: What quantity of water will be discharged into the atmosphere through 75 feet of 5-in. standard steel pipe under a discharge gate pressure of 50 psi.?

Solution: Enter the upper portion of the chart at the intersection of the horizontal line for 75 feet of pipe and the transverse line for the 5-in. pipe size. Proceed downward vertically to the intersection with the diagonal for 50 psi. gage pressure. Then proceed horizontally to the right scale of discharge in gpm. The answer is given as 2600 gpm. *Note:* If given the flow, gage pressure, and length of pipe, you can determine the pipe size by reversing this procedure.

EXAMPLE NO. 2—FLOW THROUGH VALVE

Problem: A $1\frac{1}{4}$-in. globe valve is discharging water into the atmosphere under a discharge-gate pressure of 50 psi. What quantity is discharged in gallons per minute?

Solution: Enter the upper portion of the chart at the black dot on the transverse line for $1\frac{1}{4}$-in. valve size. Proceed vertically downward to the intersection with the diagonal for 50 psi. gage pressure. Then proceed horizontally to the left scale of discharge in gpm. The answer is 150 gpm. *Note:* If given flow and gage pressure, you can determine size of valve by reversing procedure.

EXAMPLE NO. 3—FLOW THROUGH ORIFICE

Problem: A 2-in. sharp-edged orifice is discharging water into the atmosphere at a 23-ft. head (or pressure of 10 pounds gage). What quantity is discharged in gallons per minute?

Solution: Enter chart along the horizontal line of orifice sizes at 2 inches. Proceed vertically downward to the intersection with the diagonal for 10 psi. gage pressure. Then proceed horizontally to the left scale of discharge of gpm. The answer is 220 gpm. *Note:* If given the desired discharge and pressure head, you can determine the size of orifice by reversing this procedure.

Turn the page

NEW LOCK NO. 2, MONONGAHELA RIVER. First ship through on June 1, 1951 was U.S. Steel's "Homestead." A special feature of the lock is an emergency dam, at the upstream end, which can be raised or lowered as needed.

ENGINEERS PICK SUN HYDRAULIC OIL FOR NEW LOCK ON MONONGAHELA

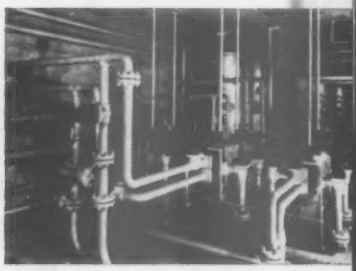
Last year the Monongahela, busy river that flows past Pittsburgh's Golden Triangle, carried 2,000,000 more tons of shipping than the Panama Canal. This year its tonnage promises to be higher still, for on June 1 the U.S. Army Corps of Engineers put in operation their new Lock No. 2, near Braddock.

The entire mechanism of this lock... gates, butterfly valves, and capstans... operates hydraulically, and a Sun Hydraulic Oil was chosen as the medium. Why? Because this vital job required an oil that would prevent corrosion and rust; that would retain its original specifications for the life of the equipment; and that would flow freely at low temperatures, yet not thin out at high. The engineers in charge chose a Sun Hydraulic Oil over all other oils because they felt it could be best counted on to keep the lock in operation and river traffic moving.

For complete information on Sun Hydraulic Oils and recommendations as to their use in your operations, write for booklet F-1.

HYDRAULIC CAPSTANS, operated by Sun Hydraulic Oil, are used when tows, too long for the locks, have to be broken up into units and pulled through mechanically.

SYSTEM'S HEART, operating the lock mechanisms, is a pair of Oilgear hydraulic pumps. They supply 2,800 gallons of Sun Hydraulic Oil at pressures up to 1,100 psi.



UNDERGROUND SYSTEM of pipe lines supplies all hydraulic devices. It is designed so that it will continue to function even though the chamber is completely flooded.

SUN INDUSTRIAL PRODUCTS

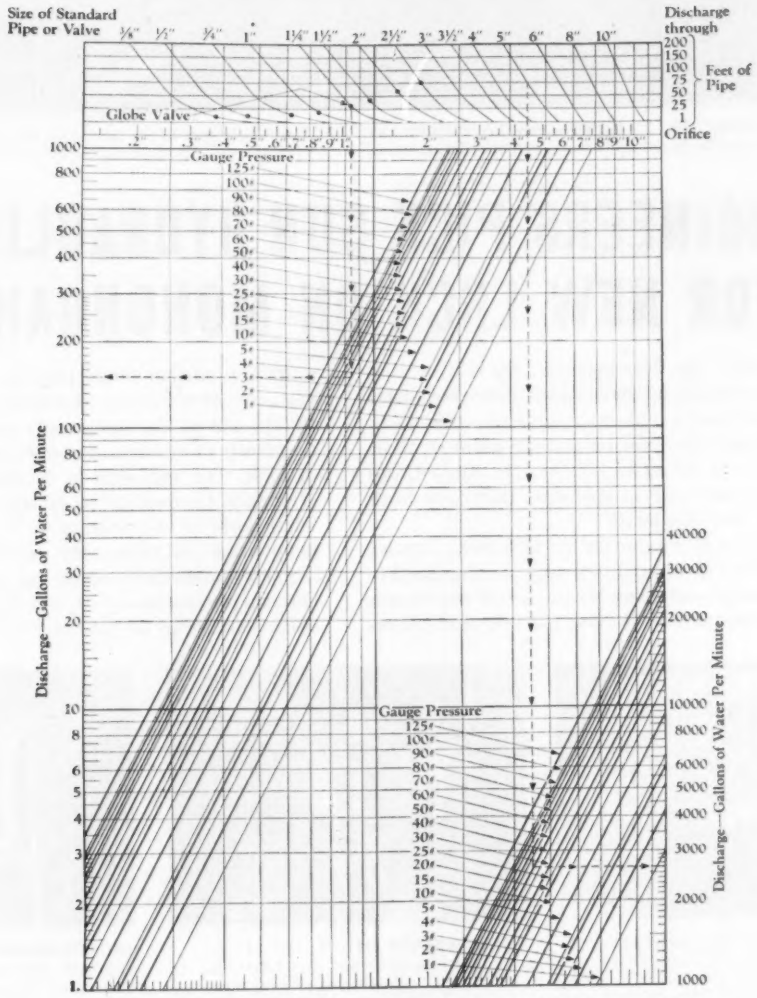
SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

SUNOCO®

maintenance data sheet 186

Begins on page 136

DISCHARGE OF WATER INTO THE ATMOSPHERE THROUGH SMOOTH PIPES, SHARP-EDGED ORIFICES AND VALVES



Prepared by **CRANE COMPANY,** 836 South Michigan Avenue, Chicago

Which to [redacted]

Ask A. O. Smith, world's leading user of welding as a production tool

Experience proves that neither an A.C. nor D.C. welder is a cure-all. Each has advantages on certain welding jobs and neither can do all welding jobs best.

A. O. Smith welding specialists stand ready to assist you, without obligation, in determining the type of welder best suited to your welding needs, best adapted to quality production with economy.

Decades of experience in the production of welded products of every description and size . . . auto frames, transmission pipe, pressure vessels, water heaters, penstocks, glass-lined tanks, to list a few . . . as well as a complete line of A.C. and D.C. welders and electrodes of all types puts A. O. Smith in a position to give you sound, dependable advice.

Simply write, stating your requirements. Without obligating you in any way, prompt assistance will be provided.

A. O. Smith Corporation
Welding Products Division, Dept. FM-152
Milwaukee 1, Wisconsin

International Division: P.O. Box 2023, Milwaukee 1, Wis., U.S.A.

A.O.Smith
WELDING PRODUCTS

Made by Welders . . . for Welders

Arma Corporation set the blood donor record for industry in its area: One out of three employees signed donor pledges. Here's how the company ran the record drive. It may help you run one in your plant.

We Gave 1004 Pints of Blood

By WELDON P. MONSON
Vice President in Charge of Employee Relations
Arma Corporation, Brooklyn

KNOWING THE NATION'S BLOOD BANK was running low, we decided to have a blood donor drive that would help both our troops in Korea and ourselves at Arma. The Red Cross supplied most of the know-how. All we had to furnish was the blood.

STEPS WE TOOK TO GET IT

1. We chose our theme · We decided that 60% of the blood we collected should go to the armed forces, the rest to the Arma blood bank we set up. Anyone who signed a pledge was automatically a member of the bank, even if Red Cross doctors wouldn't permit him to donate blood. If a blood bank member or anyone in his immediate family needed a transfusion, he could get up to three pints from the bank. It wouldn't cost him a cent, and he wouldn't even have to provide a donor to repay the blood he had needed. Non-members could get blood from the bank, but were required to provide donors for the amount of blood they had used.

2. We organized the campaign · With full union cooperation we picked committees for advertising, publicity, printing, and soliciting. We discussed, planned, and checked every detail in advance at meetings conducted jointly by the Red Cross and our plant safety engineer.

3. We advertised the drive. · We outlined containers of various sizes on a large sign near our main entrance, to show progress. We just painted in the appropriate container as the number of blood donor pledges mounted. We also used letters, bulletin boards, meetings, and the Arma house organ to keep up interest in the all-out campaign. We set as our goal 1000 pints of blood from our 4500-employee plant. The Red Cross people thought we'd set too high a figure.

4. We solicited pledges · The Red Cross furnished cards for our solicitors; prospective donors signed them. Our unions went all the way to help out. On the evening before the mobile blood bank came to our plant, we sent "Paul Revere brigades" of solicitors around the plant to sign up as many stragglers as possible. That's what brought us over the top. We had 1500 pledges when the campaign ended.

5. We scheduled the donations · This is very important. You have to make sure that blood is not taken too soon after meals or after certain foods are eaten. We formed groups of 10 to 12 employees and scheduled them in 15-minute waves. Our timetable ran three days from 9 a.m. to 9 p.m. The Red Cross provided two shifts of doctors and nurses and handled transportation of workers from outlying buildings to the blood donor center we established.

6. We collected the blood · Employees knew exactly what to do beforehand so that loss of time from work would be at a minimum. Actually, the greatest time loss was in transportation, as we have several widely-separated buildings. Doctors and nurses examined each worker before he was allowed to give blood. We had about 30% rejected. Some employees—about 50 of them—felt weak after giving blood. Naturally these employees were allowed to rest until they felt better. Before going back to work, everyone went to the Red Cross snack bar for coffee and doughnuts.

THE LESSONS WE LEARNED

Here are some of the important don'ts that we learned. They may help you avoid some pitfalls when you run a blood donor campaign in your plant:

Don't let your solicitors ask embarrassing questions of the workers. It's the doctor's job to reject. It causes bad feeling if the solicitor asks a worker if he's had malaria or TB. The idea is to sign up as many employees as possible.

Don't fail to get written parental consent from donors under 21. Many delays came as a result of some young fellow's forgetting to take his consent slip into the blood donor line.

Don't tell workers exactly how many pledges are coming in. They may lose interest in the campaign as soon as the quota seems filled. We kept about 35%-40% behind in announcing the number of pledges we'd collected; and we were glad we did. Many of our donors were rejected (about 500 out of 1500) and our lagging reports helped us meet our final goal.

Results. We collected 1004 pints of blood. We sent 600 pints of blood to the armed forces, leaving more than 400 pints for our own blood bank. Red Cross, newspapers, and many industrial plants commended us.

Alemite "Friction Fighters" WENT TO WORK HERE!

ADDED: More Production from Each Machine

REDUCED: Stock Spoilage and Down-Time

SAVED: A Total of $4,247 Every Year

Friction was once a daily menace—and a costly one—in this Chicago plant.* Protected only by old-fashioned methods of lubrication, this company's mammoth high-speed presses were breaking down with alarming frequency. Stock spoilage was high. Oil consumption ran to $5,664 a year.

Then, a trained Alemite "Friction-Fighting" specialist was called in to work with the plant engineers. After a month's test on one press an Alemite Mechanized Lubrication System was installed on all five machines in the plant at a total cost of only $2,471.

Since that time, there has not been a single breakdown or bearing loss, stock spoilage and down-time have been greatly reduced, and lubricant cost has been cut to $1,417! This is an annual saving of $4,247, *in addition* to more production gained from each press, and a marked improvement in quality for increased customer satisfaction!

No matter what size or type of plant you operate, an Alemite Lubrication Engineer can show you dozens of ways of making worthwhile savings through more efficient handling of petroleum products. These are facts which you can readily confirm in your own time studies. The Alemite man will cooperate fully with your plant engineers in setting up a test. Contact your local Alemite Industrial Distributor, or mail coupon below—today!

*Name on Request.

ALEMITE

MEANS EVERYTHING FOR LUBRICATION

1. Methods 2. Lubricants 3. Equipment

For industry, Alemite Centralized Lubrication Systems add productive time to machines with faster, more efficient handling and application of lubricants.

A PRODUCT OF SW STEWART WARNER

Loading . . . transferring . . . applying! Alemite Mechanized Lubrication Methods save time, save work, keep lubricants refinery-clean barrel-to-bearing.

FREE! New Booklet

Please send me:

☐ "11 Ways to Cut Production Cost."

☐ Include Facts on OIL-MIST—the amazing new system that atomizes oil, circulates it to bearings under pressure.

ALEMITE, Dept. G12
1850 Diversey Parkway, Chicago 14, Ill.

Name .....

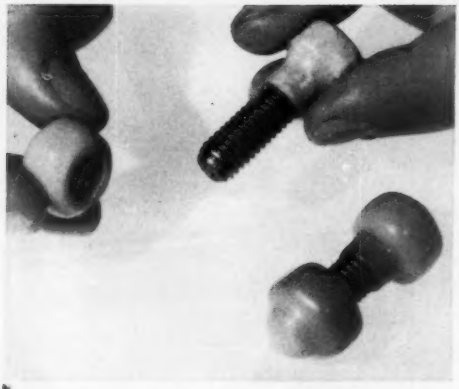
Company .....

City ..... State .....

MAINTENANCE POINTERS

FOR PLANT OPERATING EXECUTIVES

By CARL G. WYDER • Maintenance Editor, FACTORY



Plastic-encased bolts and nuts make . . .

. . . A Good Substitute for Hard-to-Get Stainless Steels

What is best today can always be improved on tomorrow. A simple case in point is the new use of vinyl-encased low-carbon bolts and nuts under highly corrosive conditions at the Industrial Rayon Corporation, Cleveland. To fasten reels on chemical tanks, this company formerly used expensive stainless steel nuts and bolts, with special rubber sealing gaskets. The splash from hot corrosive chemicals would have eaten away ordinary metal fasteners in jig time.

Then along came these Goodrich Geon-coated fasteners (shown above), made by Steere Enterprises, Akron. They cost barely one-seventh as much as stainless steel.

One year of experience has shown that they stand up as well and do just as good a job as stainless. The semi-hard coating doesn't crumble under wrench pressure and they keep a liquid-tight seal.

Where There's Waste There May Be Money

One of the prime rules for making a plant salvage program pay is to examine *everything* you now waste.

The production guys usually have product spoilage under pretty good control—or at least they ought to. It hits them in the face every time they schedule rework or write off rejects. But when it comes to what's thrown away—as in process waste, effluent, or even gases going up the chimney—there the plant engineer can shine.

If you're not including the plant engineer in your salvage program, you're leaving a loophole in your survey of where waste treatment will pay.

There are so many possibilities. Here's one, for example, in a plant that does extensive production spray painting in water-spray ventilating booths. The Maytag Company, Newton, Iowa, collects the sludge that accumulates in its water spray, sells it to a paint manufacturer for reclaiming, and buys it back as re-processed enamel for odd maintenance painting jobs around the plant. Savings—which would otherwise have gone down the drain—come to $1.60 per gallon, re-purchased.

How to Test Anti-freeze in Automotive Plant Equipment

A simple portable tester has been devised that you can use for all types or any mixture of anti-freeze solution. It was developed by R. B. Rudy and J. I. Hoffman of the National Bureau of Standards in Washington. It's described in the November 1951 issue of the Bureau's *Technical News Bulletin*.

The determination of the freeze point takes from 3 to 6 minutes, depending upon the freezing point of the solution. In principle you pass a sample through a passage 1.5 millimeters (0.06 inch) in diameter, the average size of a radiator tube. This sample is frozen under simulated flow conditions in a box of dry ice and later allowed to melt. The temperature reading at the resumption of flow is the "freeze" point. You use two pounds of dry ice in 8 to 10 hours of operation.

An inexperienced operator, says the Bureau, should obtain protection temperatures that are reliable within ± 2 degrees. This compares with readings made by service station testers that varied as much as 30 degrees from those of the NBS device.

The Bureau has prepared helpful information on automotive anti-freezes in its NBS Circular 474. You can buy a copy for 15 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

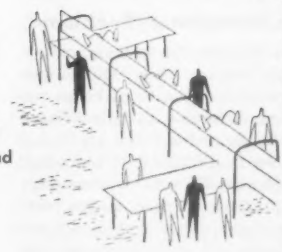
Turn the page

the truth about Dow Corning Silicones...

. . . is more fantastic than the patter of the pitchman or the spiel of the barkers that doubled in advertising and sales a generation ago. For example:

- **Silicone (Class H) electrical insulation makes motors and other kinds of electrical equipment last 10 times as long as they ever did before.**
- **These same insulating materials are used to double the power per pound ratio in electric machines.**
- **Silastic,* the Dow Corning silicone rubber is used to seal hot air at 600°F., hot oil at 350-400°F., limit switches and bomb bay doors at —100°F.**
- **Dow Corning Silicone oils and greases make permanent lubrication a practical reality.**

To many engineers and executives, such silicone facts as these still sound too good to be true. That's why we have built and assembled 16,000 pounds of demonstration units and typical applications to prove that our silicone products will do all that we claim for them. This is the first comprehensive Silicone Exposition ever assembled. Previewed in Washington, D. C. during the week of October 22nd, this exhibit will be given private showings in major industrial centers across the country.



DOW CORNING SILICONE EXPOSITION
now scheduled for

CLEVELAND
DETROIT
PHILADELPHIA
NEW YORK
BOSTON
PITTSBURGH
CHICAGO
WICHITA
FORT WORTH
LOS ANGELES

If you want to know more about this Exposition write for complete information including our new 32-page book which answers in simple words and pictures, the $64 question, "What's a Silicone?" Address Department **L-13**

DOW CORNING CORPORATION
Midland, Michigan

ATLANTA
CHICAGO
CLEVELAND
DALLAS
LOS ANGELES

DOW CORNING SILICONES

*T.M.REG.U.S.PAT.OFF.

DOW CORNING CORPORATION

NEW YORK
WASHINGTON, D. C.

MIDLAND, MICHIGAN

VISIT OUR BOOTH
PLANT MAINTENANCE SHOW
PHILA. JAN. 14-17

In CANADA: Fiberglas Canada, Ltd., Toronto • In GREAT BRITAIN: Midland Silicones, Ltd., London

MAINTENANCE POINTERS ... *Begins on page 142*

This Plant Engineer Keeps Looking for Trouble

We promised him we wouldn't mention his name, although we think you'd recognize his plant by reputation if we did. But we can say we think he's a pretty smart plant engineer.

Here's one of several reasons why: **He's always on the lookout for trouble.** He makes it a point to follow up *personally* on all complaints or rumors of trouble from production men—no matter how high or low the rumor source. And mind you, this plant employs over 8000 people.

The reason? Trouble is always a clue to a chance for mechanical improvement, he says. And most of the time the production supervisor has a reason for his gripe, but isn't able to analyze the basis for it. He may be blaming the operator when the fault lies with the machine. Or he may be asking for a stop-gap remedy where an improvement will be the cure.

It takes an engineer to spot and handle situations like these, says our friend. So he lets everybody know he considers it part of his job to ferret out the kinks and weak spots in production.

The result? When we toured the plant one day with our plant engineer friend, *everybody* we met said a cheerful hello. We could see how well he rated with the non-maintenance personnel.

Maybe an Amputee Can Solve Your Maintenance Manpower Problem

This idea comes from Warren Clark, maint nce manager of Kearney & Trecker Corp., Milwaukee.

While listening to police radio calls at home one night he thought: Why not channel all calls through a central dispatcher? It seemed worth a try.

"We wasted no time in notifying everybody," says Clark, "to put through all calls to one designated number. We equipped our man with a telephone head-set and a loud speaker that covers our general maintenance area. All routine trouble jobs are routed from his desk. Jobs needing a maintenance foreman are held until the foreman returns. In between calls the dispatcher types reports, inserts catalog pages, makes out time tickets, and does general office work."

That's only part of the story. Clark got a Class A electrician whose legs had been injured to fill the job. This man had a general knowledge of the work and a patient temperament, plus ability to type.

How well did it work? According to Clark: "We have noticed a big cut in errors in time tickets, and a whale of a saving in foremen's time. It has also shown how a disabled man can earn his pay in a maintenance department and know he is increasing its efficiency."

Steam cleaning of unit heaters shows . . .

. . . How Methods Improvement Can Save Money in Plant Maintenance

We've been preaching from the housetops for a long time that methods studies will pay off in maintenance. Plant engineers at the 127-acre Peoria plant of the Caterpillar Tractor Company have turned in some first-class evidence that shows how methods studies helped Caterpillar.

The company didn't like the tedious way their men used to clean the dirt and grease in the heating coils of some 400 unit heaters. They had to remove each heater, by disconnecting pipes and wires, and clean it by hand with a brush. It took 16 to 24 man-hours per heater.

The new way is 10 times faster—two men clean 10 heaters in an 8-hour day. They use a steam cleaner to spray wet steam, plus a chemical additive, over the heater frame and through the coils.

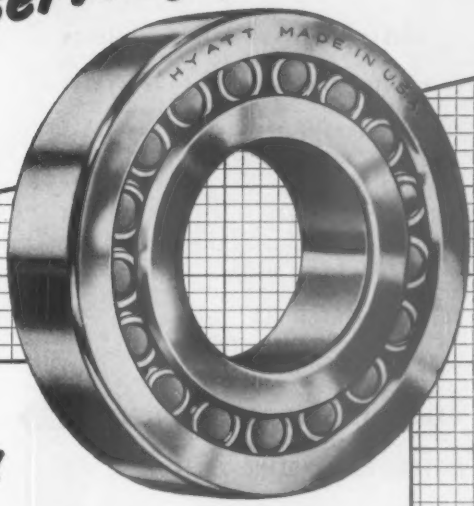
But that's not all. One side of the blower fan bracket has been changed from a bolted to a hinged mounting, so the fan can be swung 180 degrees out of the way. Then, the men hoist up a specially designed aluminum hood to enclose the back, sides, and bottom of the heater frame. This hood catches the sprayed wet steam, dirt, and oil and drains them off through a run-off tube into a waste drum. It's as simple as that.

This achievement leads me to remind you of another old moral that still needs to be learned: Easy maintenance begins with design. And don't overlook re-design—Caterpillar men didn't—if the original isn't quite right.

Turn to page 228 for good ways to solve special plant engineering problems.

1892–1952

60 Years serving industry



. . . and still going like sixty!

Continuing progress has marked the last fifty-nine years for Hyatt. But 1952, our sixtieth year, finds us expanding our facilities in anticipation of the greatest year in our history.

Plant extensions, under way right now, are adding valuable manufacturing space at Harrison, and additional construction will double the available floor space at our second plant in Clark Township, New Jersey.

These new improved facilities and additional equipment combined with traditional Hyatt manufacturing skill help satisfy the ever-increasing demand for dependable Hyatt Roller Bearings.

To our many friends in the agricultural — textile — petroleum — construction — automotive — railroad — aviation — steel — material handling—and other fields, we again say "Thank You" for your continued use of Hyatt Roller Bearings.

And we intend to keep on "going like sixty" in every department to furnish better roller bearings in ever-increasing quantities to meet your requirements. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Chicago; Detroit; Pittsburgh; Oakland, Calif.

HYATT ROLLER BEARINGS

WHAT'S NEW IN EQUIPMENT

. . . BRIEFED HERE FOR THE CONVENIENCE OF PLANT OPERATING MEN IS INDUSTRIAL PLANT EQUIPMENT NOW ON THE MARKET . . .

AIR CONDITIONING 154

AUXILIARY EQUIPMENT 159

BUILDING MATERIALS 161

ELECTRICAL EQUIPMENT 164

MAINTENANCE TOOLS & SUPPLIES STARTS HERE

MATERIALS HANDLING 170

SAFETY 186

VALVES, PIPING & ACCESSORIES 188

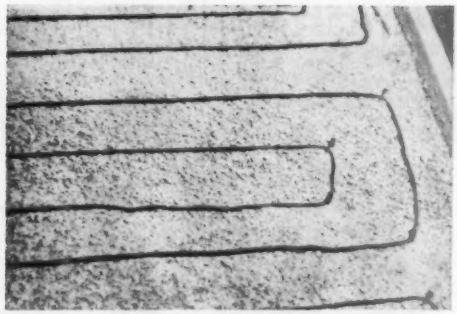
MISCELLANEOUS 192

IN THE NEXT ISSUE ..... **Some notes on important late items. More about them next month.**

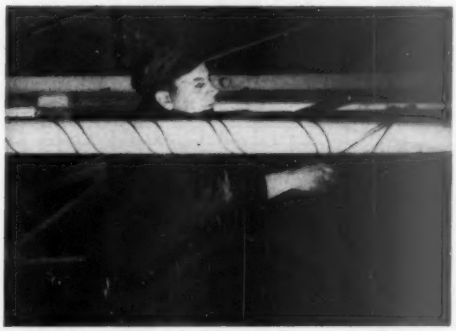
Non-Fouling Spark Plugs for materials handling trucks promise to ease a major maintenance headache. Plugs have radical new design, never require re-gapping, and eliminate need for frequent cleaning.
Circ-O-Fire Spark Plug Co., Detroit, Mich.

First Aid for Floors takes the form of Roc-Wood. Maker says this new floor resurfacer looks like expensive cork flooring, yet lasts longer than concrete. It's made of hardwood fibers held together with a plastic binder.
Roc-Wood Flooring, 364 E. 23rd St., Chicago 16.

Shut-Off Valve automatically cuts gages from your pneumatic and hydraulic systems whenever the pressure exceeds safe operating limits. When pressure drops below danger zone, valve brings gages back into the system.
Sprague Engineering & Sales Corp., Gardena, Calif.



IN CONCRETE DRIVES to remove snow . . .



ON LIQUID LINES to prevent winter freeze-up . . .

Auxiliary Heat

JUST A LITTLE HEAT in the right places may be all you need to winterize your plant and equipment. Just enough heat to remove snow from walks and driveways, to prevent pipe freeze-up, or to forestall roof damage in severely cold weather. If you need that kind of heat, you can get it simply and quickly with electric heating cable.

Latest entry into this field is Thermwire. It's a loop of nichrome heating wire encased in a fire-resistant, weather-proof sheath.

You can wrap Thermwire around pipes, immerse it in liquids, embed it in concrete, asphalt, or soil, or simply run it under mats or wooden platforms. The cable has a 10-ft. rubber-insulated cold lead section. Thermostatic control is optional. You can get Thermwire in 80-ft. (115-volt) and 160-ft. (230-volt) lengths, also in bulk. In any case, when you plug it in, you get 5 watts of auxiliary heat per foot of cable.

That's not enough for comfort or heavy process heating. But it's the sort of low-temperature, localized heating that can save the day for plant and equipment in a rugged winter. You can put Therm-

ON ROOFS to prevent accumulation of ice . . .

ON PROCESS EQUIPMENT to stop condensation.

by Electric Cable →

wire into a permanent installation. Or use it over and over again for temporary jobs. Here are some ways you can make it work for you:

On plant roofs to prevent accumulation of ice and snow. You can easily string Thermwire along gutters and downspouts. One cable protects about 23 linear feet.

Embedded in concrete or asphalt to keep plant driveways and walks clear even during heavy snowfalls. On existing floors you can lay Thermwire beneath a ¾-in. layer of floor topping. In new construction, you tie it to the reinforcing steel. About 25 watts per square foot should do the job.

Wrapped around pipes to prevent winter freeze-up. One Thermwire cable will protect up to 40 feet of ¾-in. water pipe.

On process equipment to avoid damaging condensation or freeze-up. Or to keep viscous liquids flowing if normal heating fails.

Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8.

Turn the page

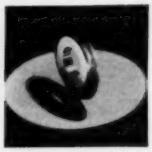
Thousands of Parts Are Heat Treated Daily in 'Surface' Hardening Furnaces

Successful heat treatment means control of costs, economy in operation, conservation of labor and materials

★ During the past 10 years people making adding machines, milling machines, tanks, trucks, dies, gears, typewriter parts and many other items have steadily increased their reliance on 'Surface' Standard Rated Hardening furnaces.

Selection of a furnace for hardening operations depends on production rate required, contour and dimensions of the part, temperature required, and desired final surface condition.

Cutter wheel liquid heated at 1550°F for 20 mins. in 'Surface' Standard Rated Pot Furnace.



Electric Refrigerator shaft steel hardened in 'Surface' Standard Rated Small Oven Furnace

To meet these needs, 3 general types of hardening furnaces are available, each in many models and sizes: *Oven Type:* direct-fired; standard hearth areas are 1.5 to 45 sq. ft. Larger sizes are available, if required. For hardening where volume production and flexibility to handle large pieces are important. Send for Literature Group HO.

Pot Type: used where charge must be protected from air or decrementally heated. These furnaces are used for heating salt, oil or lead for interrupted quench baths. 24 standard sizes. Circular or rectangular. Send for Literature Group HP.

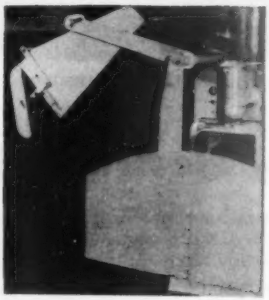
Prepared Atmosphere Type: for complete surface protection and where dimensional stability is required. Muffle type, externally fired. Send for Literature Group HA.

SURFACE COMBUSTION CORPORATION
TOLEDO 1, OHIO

(ADVERTISEMENT)

1 MAMMOTH BUT MANEUVERABLE, this kingsize cleaner pivots smartly on one wheel. Unit does the work of 6 to 18 men.

2 STEEL CUTTERS for stubborn floor grime and . . .



3 DIRT HOPPER that dumps itself make unit a . . .

One-Man Cleaning Crew

This Tennant truck can give your plant floors a new look after one pass. The unit will recondition up to 60,000 square feet per hour, do the work of a 6- to 18-man scraping crew.

A powerful steel wire brush sweeps clean a path 36 inches wide. The high-speed brush shaves off hard-packed grease, paint, imbedded metal chips and dirt, tossing it into a 10-cu.ft. hopper. A vacuum fan sucks up lighter dirt. For extra-heavy work there's a special cleaning cylinder set with tool steel cutters. This "pulverizer" will level irregular floors, groove concrete, and grind down protruding bolt studs.

Operator controls dump hopper and brush lift from his seat.

G. H. Tennant Co., 2530 N. 2nd St., Minneapolis 11.

Turn the page

BEFORE BUYING *any* BLOWER COMPARE THESE ESSENTIALS

- ☐ Choice of Rotary or Centrifugal
- ☐ Capacity matched to the job
- ☐ Easy accessibility
- ☐ Ruggedness
- ☐ Ease of installation
- ☐ Ability to handle overloads
- ☐ Long-time durability
- ☐ Freedom from breakdowns
- ☐ Low maintenance costs
- ☐ Engineering assistance
- ☐ Proved reputation of maker
- ☐ Customer satisfaction

Single-Stage, Type OIB Centrifugal Blower in food processing plant. Steam turbine drive. Capacity 12,000 cfm.

When production depends so vitally on adequate handling of gas or air, you can't afford to take chances on the performance of your blowers or exhausters. It's better to be safe than sorry.

So, for new installations or replacements, we suggest that you evaluate the equipment by the above standards of comparison. This will help determine the unit that will be most effective, economical and reliable for your specific applications.

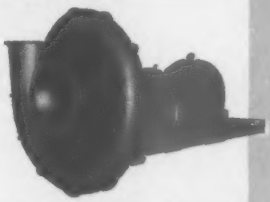
Be sure to include the R-C *dual-ability* line of both Centrifugal and Rotary Positive types. Remember that only we offer you this *dual choice*—with unbiased recommendations from almost a century of experience. With capacities from 10 cfm to 100,000 cfm or higher at moderate pressures, R-C equipment has a long record of outstanding performance in industrial applications.

We'll gladly send detailed information for comparison—or supply engineering help if we can be of service.

ROOTS-CONNERSVILLE BLOWER CORPORATION
521 Central, Connersville, Indiana

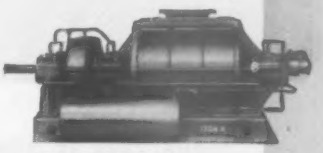
THE *DUAL-ABILITY* LINE OF MODERN EQUIPMENT TO HANDLE GAS AND AIR

Multi-Stage Centrifugal Exhaustors



Single-Stage Centrifugal Blowers

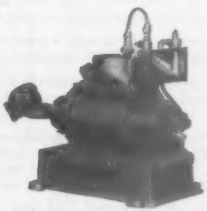
Rotary Positive Blowers



Rotary Positive Gas Pumps

ROTARY

Type RCDH Blower in electric power plant, with capacity of 3,380 cfm.



Positive Displacement Meters

Inert Gas Generators

Reg. U.S. Pat. Office

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

190 MORE PACKAGES STRAPPED EVERY DAY!

leadership is know-how in action!

To translate know-how into action for best results . . . never to be satisfied, even with your own best efforts . . . is the Signode formula for work-a-day operations — *and the reason for Signode's leadership.*

A good example of Signode's leadership formula at work is the case of the Signode customer 100% satisfied, and the Signode field man who wasn't.

Signode previously had installed the best packaging method known. It boosted the manufacturer's shipping room output to 560 cartons a day, with minimum labor used.

But neither progress nor Signode stands still. That's why Signode engineers pioneered and perfected the revolutionary, efficient power strapping machine—why the Signode field man in the manufacturer's territory saw in this better equipment a way to increase his customer's daily shipments.

And it did—34% more! **The new power strapping machine turned out 750 perfectly strapped cartons every day—190 more cartons than ever before!**

Wouldn't you like to have *the leader's know-how* help you make the best use of the steel strapping allotted you for packaging defense and essential civilian and other orders? Write,

SIGNODE STEEL STRAPPING COMPANY

2663 N. Western Avenue — Chicago 47, Illinois

this seal means security in shipping

Offices Coast to Coast
In Canada: Canadian Steel Strapping Company Ltd.
Foreign Subsidiaries and Distributors world wide.

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 146

Economical Spray Gun

You can paint with the Electrospray gun in your best Sunday suit. That's because there is little or no paint fog or spray dispersion. That means less paint waste. It also means you can often eliminate expensive cover-up when painting in machine tool bays and office areas.

In addition, Electrospray is light weight for a self-contained spray unit. It weighs 3½ pounds, and is extremely mobile since it needs only one electrical connection. You just plug Electrospray into the nearest light socket.

Gun is trigger-operated. Convenient paint container quickly clamps into place, can be changed easily in the middle of a job. You can adjust paint output from finely atomized spray to large volume spray for heavy coatings. You can select one of three spray patterns —round, horizontal fan, and vertical fan.

Spray can be set in an accurately concentrated beam that will penetrate into hard-to-get-at places. And no waste spray will stain surrounding surfaces. Maker claims Electrospray eliminates the necessity of masking.

Philip Loris Co., Cromwell, Conn.

■

D-C Welder Eliminates Stack Failure

No stack failure in the Smith d-c welder, says the maker. The rectifier stacks are cooled by a

In Airfreight—we were the "Founding Fathers"

American Pioneered In Airfreight — Has Handled More Freight Than Any Other Airline . . .

ALMOST A DECADE AGO, American Airlines inaugurated the first airfreight service in the United States. In the constant improvement of this service, we were also first to open our own freight terminals; first to put airfreight on daily schedules; and first to develop special new freight-handling equipment and techniques.

This experience, broadened over the years, is far more than an assurance that your shipments will be expertly handled and reliably delivered by American Airlines. *It means that we are better qualified to help solve your distribution problems than any other airfreight carrier.*

We'll be glad to prove this right in your own office, knowing that you will then decide to join the hundreds of companies already profiting from our pioneer background. Simply wire us *collect* and a representative will call on you promptly. American Airlines, Cargo Sales Division, 100 Park Ave., New York 17, N. Y.

Check American First

For Every Airfreight Problem—Here's Why

CARGO CAPACITY *American has the greatest available ton-mile capacity of any airline*

HANDLING FACILITIES *American's airfreight facilities are backed by the largest personnel force of any airline*

EXPERIENCE *American has been operating airfreight service longer than any other airline*

COVERAGE *American directly serves more of America's leading business centers than any other airline*

KNOW-HOW *American has handled more freight than any other airline*

AMERICA'S LEADING AIRLINE

AMERICAN AIRLINES INC.

GET A FREE Tuffy SLING AND PROVE TO YOURSELF IT'S MORE FLEXIBLE!

Yes, here's your chance to see for yourself the braided wire fabric of which TUFFY Slings are made. Tie it in knots, kink it—then see how easily a Tuffy sling can be straightened out without material damage.

Patent No. 2,454,417

HOW Tuffy SLINGS ARE MADE

Scores of wires are stranded into nine parts, then machine woven into an interlaced wire fabric. This braided fabric gives extra safety and enduring strength. Even cutting one of the 9 parts does not result in stranding of the sling.

11 TYPES—PROOF TESTED FOR SAFETY

There are 11 different types of Tuffy Slings, each one proof-tested to *twice* its safe working load. And the safe working load is plainly marked on metal tags on each sling. Also, Union Wire Rope engineers will help work out special sling problems. If you have your own rigging loft, Tuffy braided wire fabric is available by the reel.

FREE SAMPLE—MAIL COUPON

To show you the difference between TUFFY Braided Wire Slings and ordinary wire rope slings, we have made up a quantity of 3-foot slings. We want you to have one so that you can test it and prove to yourself that TUFFY Slings really are better. Mail the coupon below today for yours.

UNION WIRE ROPE CORP.

More scrap means more steel turn yours in today!

UNION WIRE ROPE CORPORATION
Specialists in Wire Rope, Braided Wire Fabric and High Carbon Wire
2234 Manchester Ave. Kansas City 3, Mo.

Gentlemen: Please have my Union Wire Rope fieldman deliver me a FREE Tuffy Sling.

Name_____

Address_____

City_____ Zone____ State_____

Firm Name_____

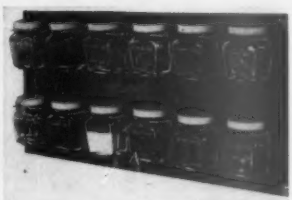
NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 146

high velocity blast of air. Fan and welder case are designed to channel cooling air effectively over all energized parts. The Smith welder comes in 200-, 300-, and 400-amp. ratings.

A. O. Smith Corp., 27th & Keefe Sts., Milwaukee 1.

■



Small Parts File

Here's a simple way to keep small parts labeled and available. The Handi-Jar is really a visible filing system. The screw-top jars are held in place by spring clips. There's space on the front of each jar for fixing identification labels. Composition board with 12 4-oz. jars costs $3.20.

Handi-Jar Corp., 1601 Fisher Bldg., Detroit 2.

■

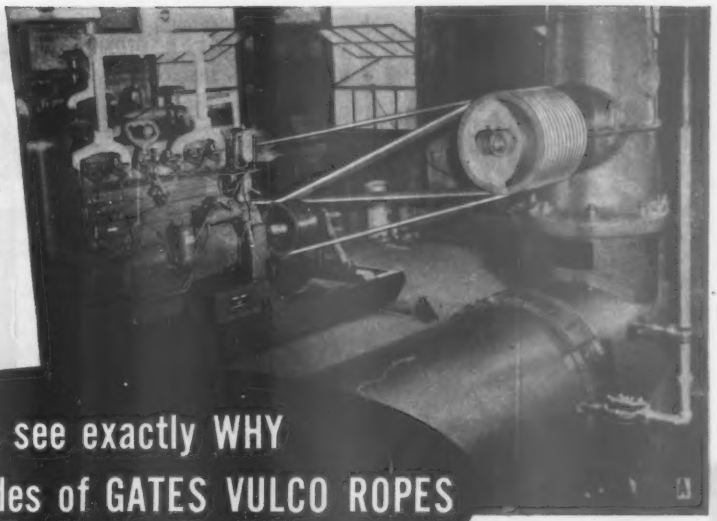
DIANOL PAINTS INSECTS AWAY with one application. You mix Dianol with your wall or floor paints—then apply. For the life of the paint, Dianol stays on the job, dealing death and destruction to flying, crawling, chewing, and sucking insects. According to the Dianol Sales Corp., Allentown, Pa., this "mix-with-paint" insecticide is odorless, non-toxic, does not change the color of the paint. You can mix it with just about any kind of paint.

Turn the page

Cash in Your Scrap!

The copper shortage is getting worse every day. Every pound of scrap helps.

To drive one of the new high capacity pumps which removes surface water and runoff from 15,000 acres of Illinois farmland, members of the District Board chose Gates Vulco Ropes, running from two diesel units.



Let's see exactly WHY the Concave Sides of GATES VULCO ROPES mean lower V-Belt Costs!

Every engineer knows how a V-belt *changes shape* when it bends around a pulley.

The top of the belt is under tension—making it grow *narrower.*

The body is under *compression,* causing the sides to bulge out!

Look at figure 1-A in the diagrams, herewith. There you see how a *straight sided* V-belt is forced to bulge in its sheave-groove—and this bulging naturally causes extra wear along the middle of the sides as indicated by the arrows.

Now look at the figure 2-A. There you see how the precisely engineered Concave Sides fill out to an exact fit in the sheave groove.

Clearly, the Concave Sides press *evenly* against the V-pulley. This means uniform wear; longer life! The Concave Sides have *full traction;* wear longer because of *full contact!*

To sum up: The Concave Sides of Gates Vulco Ropes (U.S. Patent No. 1813698) give you (1) Less wear, (2) More pulley contact, (3) More sure power transmitted when needed!

Only V-belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt

Fig. 1

Fig. 1-A

How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

Gates Vulco Rope with Concave Sides

Fig. 2

Fig. 2-A

The Concave Sides Fill out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-521

World's Largest Maker of V-Belts

Gates

Hose V-Belts Molded Rubber Goods for Industry

VULCO ROPE DRIVES

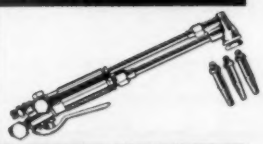
ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY • DENVER • U•S•A

Dockson Torches

for Oxy-Acetylene

WELDING



and CUTTING

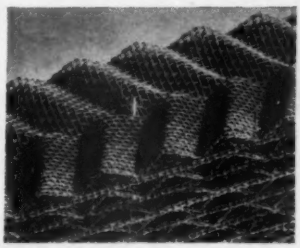
and CUTTING ATTACHMENTS

are Built for Better Service

THERE IS A DOCKSON DISTRIBUTOR NEAR YOU
—name upon request

Dockson CORPORATION
3839 WABASH • DETROIT 8, MICH.

AIR CONDITIONING



High-Velocity Filter

The Viro-Crimp air filter operates at constant efficiency at face velocities ranging from 300 to 500 fpm. The filter core is a viscous-type galvanized wire mesh. The mesh is so arranged in horizontal layers that there are no straight-through air passages. As a result the air flows, in effect, through a series of baffle walls.

Air Filter Corp., 108 N. Water St., Milwaukee 2.

■

Auxiliary Cooler Unit

Temporary cooling of warehouse areas, laboratories, annealing rooms, etc., is the job of the 36T Mobile Cooler. This trailer-mounted air conditioner brings a cooling power of 39,000 Btu. per hour right to the job.

Unit is electrically driven, completely self-contained. It supplies 100% outside air to the cooled area. So there is no need for return duct connections. And no worry of recirculating noxious or hazardous fumes. A flexible duct 25 feet long connects the unit to the space to be cooled.

Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.

Turn the page

THE Right PROTECTION

is DOCKSON HELMETS and HANDSHIELDS

BE SAFE against sparks, flash and dangerous rays of arc welding. DOCKSON HELMETS and HAND SHIELDS are leak-proof, shock-proof, and equipped with Federal specifications plates.

BE COMFORTABLE in roomy, light-weight DOCKSON HELMETS—adjustable, cushioned headgear; form-fitting chin rests; spring pivot holds shield in any position, allows easy raising and lowering.

BE ECONOMICAL, get longer use from DOCKSON HELMETS & HAND SHIELDS . . . every one "BUILT FOR BETTER SERVICE".

THERE IS A DOCKSON DISTRIBUTOR NEAR YOU.— Let us send you his name and our catalog of Welding and Cutting Equipment.

Dockson CORPORATION
3839 WABASH • DETROIT 8, MICH.

G-E Adjustable-speed Drive Increases Ozalid Machines' Versatility, Accuracy

Reproduction machine's speed easily set for various kinds of paper, with electronic Thy-mo-trol* drive

Reproducing "short-order" copies of virtually any kind of printed matter, drawings, etc. is the function of Ozalid's new Ozamatic machine. One secret of the versatility of this and all other Ozalid machines is G-E Thy-mo-trol drive.

Speed of the machine must be matched to the type, weight, and thickness of paper being used in each copying job. The simplicity of the Thy-mo-trol drive permits the operator to make the proper speed adjustment quickly and accurately simply by turning the speed-control knob. Thus, the machine can handle a great variety of copy jobs quickly, and with little training required for the operator.

The electronic precision of Thy-mo-trol, one of G.E.'s adjustable-speed family, has helped many equipment manufacturers improve the performance of their machines by greatly increasing their versatility and accuracy. And G-E adjustable-speed drives are helping manufacturers in every field to increase production with improved quality control, saving scarce materials, cutting rejects, and making existing machinery more flexible. One or more of this versatile drive family can probably do the same for you. Best way to find out is to mail the coupon below.

ON THE OZAMATIC, Ozalid's new desk-top machine, the operator quickly and accurately selects the desired speed—from 0 to 30 feet per minute—simply by turning the speed-control knob. Electronic Thy-mo-trol drive—standard equipment on all Ozalid machines who pioneered its use on reproduction machines—does the rest.

WHICH DRIVES ARE BEST FOR YOU?

This 26-page manual will help you decide. It shows you how to go about selecting the *right* drive. The handy drive chart included is worth your detailed study. Bulletin GEA-5334. Check here.....☐

General Electric Company, Section D 646-17
Schenectady 5, N. Y.

Please send me the bulletins checked:
☐ for reference only
☐ for planning an immediate project

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

THE ACA MOTOR—*Speed ranges to 20:1*—An adjustable-speed a-c motor. Speed range 3:1 or 4:1 continuous; for intermittent operation from 6:1 to 20:1. Bulletin GEA-4883. Check here.....☐

THE SPEED VARIATOR—*Speed ranges to 40:1*—An adjustable-voltage d-c drive that uses a-c power. Speed ranges 8:1 to 40:1 and beyond. Bulletin GEA-5335. Check here.....☐

THY-MO-TROL*—*Speed ranges to 100:1*—The most accurate, most versatile, and fastest acting of all G-E adjustable-speed drives. Speed ranges of 100:1 or better. Bulletin GEA-5337. Check here.....☐

ELECTRONIC SPEED VARIATOR—An electronically controlled version of the Speed Variator that offers most of the features of Thy-mo-trol for applications in the 15 to 60-hp range at moderate cost. Bulletin GEA-5336. Check here.....☐

*Thy-mo-trol is the General Electric Company's registered trademark for its electronic motor-control system.

Headquarters for ELECTRICAL ADJUSTABLE-SPEED DRIVES

GENERAL ELECTRIC

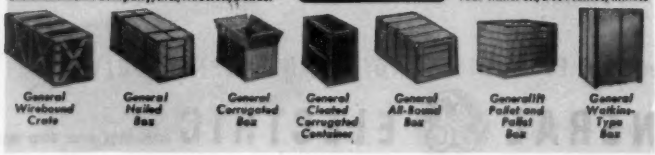
Generalift
★ ★ ★ ★ ★
PALLET BOXES

1. CUT MATERIALS HANDLING COSTS
2. SHARPLY REDUCE STORAGE COSTS

Write for your FREE copy of "The General Box." It shows how to Cut Packing and Shipping Costs.

DISTRICT OFFICES AND PLANTS:
Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, Meridian, Sheboygan, Winchendon.
Continental Box Company, Inc., Houston, Dallas.

General ★★★★★ BOX COMPANY
engineered shipping containers
GENERAL OFFICES:
1807 Minor St., Des Plaines, Illinois



AIR CONDITIONING EQUIPMENT

Begins on page 154

Air Diffuser With Variable Effective Area

You can change the air volume and throw off this Flexiflo diffuser without changing the air diffusion pattern. It's all done with a conical spiral, says the manufacturer. By opening or closing this spiral diffuser blade you vary air flow and throw. But the diffusion pattern stays the same.

Flexiflo is designed for overhead projection heaters. It's said to be the only diffuser with a built-in equalizing deflector. And maker claims the Flexiflo handles a greater air volume than similar diffusers with the same neck area.

Flexiflo comes in 11 sizes. The largest handles up to 9000 cfm., has a throw of over 48 feet.

Universal Diffuser Corp., 890 Whittier St., New York 59.

■

Gas-Fired Unit Heaters

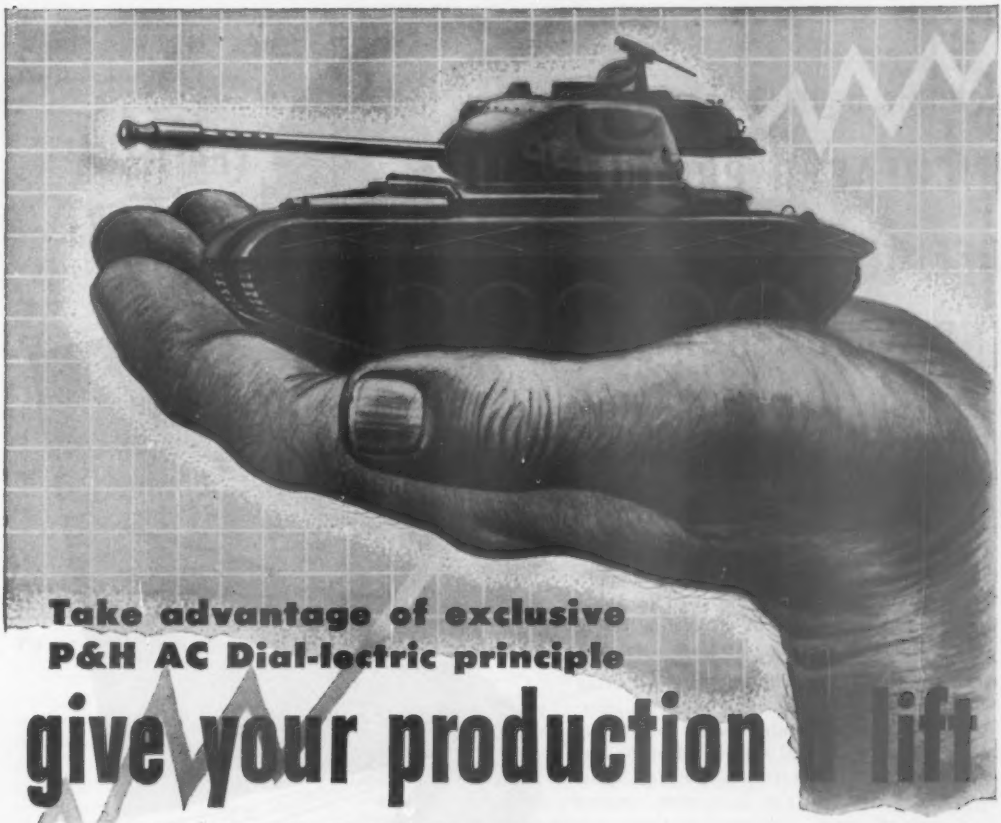
Features of the new Modine gas-fired unit heaters are greatly reduced weight and bulk, faster response to thermostatic control, and lengthened service life.

Units come in five sizes, ranging from 65,000 to 165,000 Btu. per hour. Model 105, with an input of 105,000 Btu. per hour, weighs 106 pounds.

All models are approved by A.G.A. for use with natural, manufactured, mixed, and liquefied petroleum gases. They are equipped with built-in draft diverters and fan guards, automatic safety controls, and bonderized casings.

Modine Mfg. Co., Racine, Wis.

Turn the page



Take advantage of exclusive P&H AC Dial-lectric principle

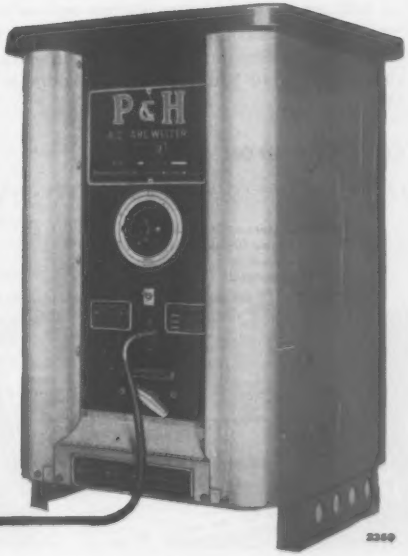
give your production lift

— with safe, open-circuit voltage . . . easy, quick-start arc . . . time-saving, built-in remote control . . . compact AC design

Armor plate welding calls for low-hydrogen or stainless steel electrodes. P&H, pioneer in the low-hydrogen field, also offers the AC welder that gives you the best weldability with these rods — for greater production.

Your men like the P&H AC Dial-lectric — like its safety under the most adverse conditions; like the easy, quick-start arc, the elimination of arc-blow. And they get more done! Get sounder, better looking welds in less time, thanks to built-in remote control which lets them select the right heat at the work, turns *walking time* into *welding time.*

Because these welders give production such a lift, P&H has stepped up its delivery schedules to meet defense demands without delay. Get your production rolling in high gear. Order your P&H AC Welders today. Capacities up to 650 amps. Take advantage of this delivery situation while it lasts.



P&H **WELDING DIVISION**
4573 W. National • Milwaukee 14, Wis.
HARNISCHFEGER CORPORATION

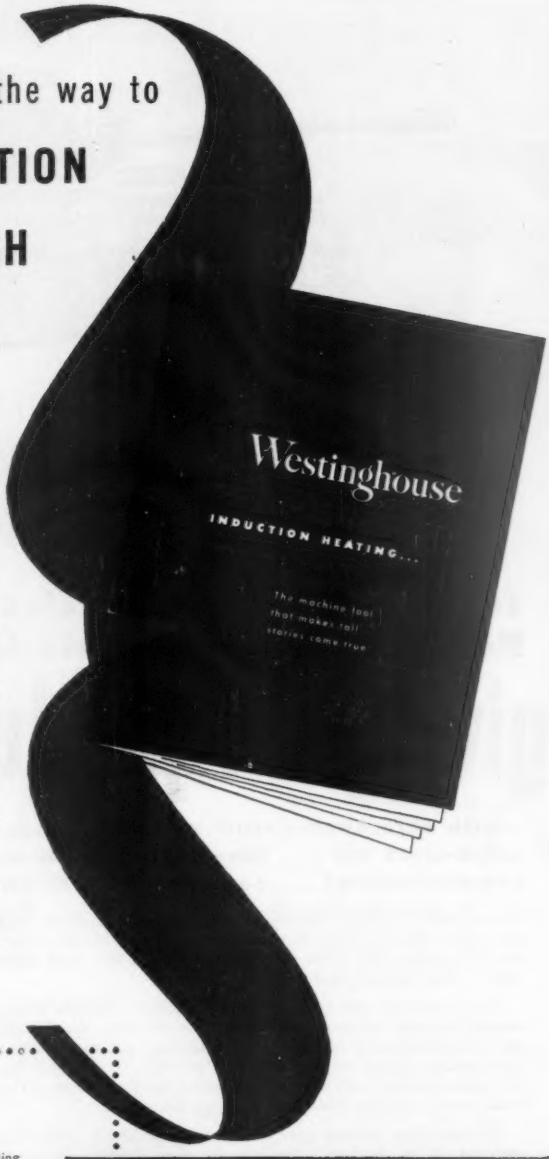
2360

Let this booklet show you the way to

INCREASED PRODUCTION EFFICIENCY THROUGH INDUCTION HEATING

Westinghouse has prepared a Case History Booklet showing a few of the Induction Heating applications presently being used by some of America's largest manufacturers. It's one amazing record after another of what Induction Heating can do . . . backed up by product, production and cost comparison figures. Some cases may remind you of situations in your plant. Others may suggest application possibilities not yet tried. But all the stories will give you a good idea of the ever-increasing scope of Induction Heating.

Already, thousands of different parts are being hardened, annealed or joined by Induction Heating. But there are thousands more that could be . . . and should be heat treated by this method. *Because in virtually every case where Induction Heating has been put to work, the user has gotten increased production efficiency . . . at lower operating cost!* But see for yourself what this outstanding tool can do. Just clip the coupon for your free copy of this informative booklet — or drop us a line with your request to Westinghouse Electric Corporation, Dept. F-38, 2519 Wilkens Avenue, Baltimore 3, Maryland.



CLIP THIS COUPON

Westinghouse Electric Corporation
Electronics & X-ray Division, Dept. F-38
2519 Wilkens Avenue
Baltimore 3, Maryland

Please send me a copy of the detailed Westinghouse Induction Heating Case History Booklet.

Name _____ Title _____

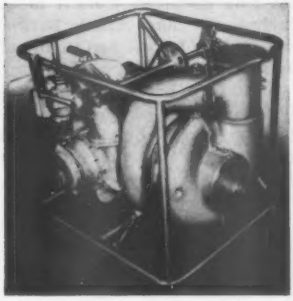
Company _____

Street _____

City _____ Zone _____ State _____

YOU CAN BE SURE... IF IT'S
Westinghouse
INDUCTION HEATING

AUXILIARY EQUIPMENT



Gas-Turbine Power Plant

A new gas-turbine unit provides a compact, lightweight source of auxiliary power. The unit develops 45 hp. at a turbine speed in excess of 40,000 rpm. It operates on diesel fuel.

You can use one of these units to power auxiliary pumps, blowers, and electrical generators. The unit is completely portable and independent of electrical outlets. It has its own centrifugal air compressor, and is ordinarily started by two men turning a crank. One man can do the job in an emergency.

The unit is lightweight, too. The pump and turbine combination shown above weighs only 165 pounds.

Solar Aircraft Co., 2200 Pacific Highway, San Diego, Calif.

■

Heavy-Duty Blowers

A new line of fabricated steel blowers ranges in size up to 200 hp. Delivered air pressures range up to 3 psi. Maker claims high power economy, since power consumption is directly proportional

with **THE MULTI-CLEAN METHOD!"**

"Keeping our floors sealed with Multi-Clean Concrete Preserver holds dust to a minimum throughout the plant and makes them easier to keep clean and sanitary," says the floor maintenance director of Griggs, Cooper and Company, large mid-western food processing firm.

"Daily sweeping time has been cut at least one-third because heavier dirt doesn't stick to the hard, smooth finish, and dust sweeps up easily. Moisture, too, is prevented from penetrating the floor surface, and makes it impervious to alkalies, grease, acids, etc.

"In our spice and baking powder rooms, dust is extremely fine and hard to sweep up. Here we use the Multi-Clean industrial vacuum which gives us an efficient and dust-free operation.

"We wet mop all our concrete floors once or twice a week and buff them once a month with a fine steel wool disc under a Multi-Clean floor machine to loosen any stubborn dirt and restore the finish. Multi-Clean Concrete Preserver is applied every 6 months to a year, depending on traffic conditions.

"With the Multi-Clean Method of floor care, our concrete floors are kept in better condition to stand the rigorous traffic they get every day. Then, too, they're always clean and attractive, and repairs and replacements are practically non-existent."

Multi-Clean Concrete Preserver

Multi-Clean Floor Machine

Multi-Clean Wet-Dry Vacuum

Every Multi-Clean product carries a 100% guarantee.

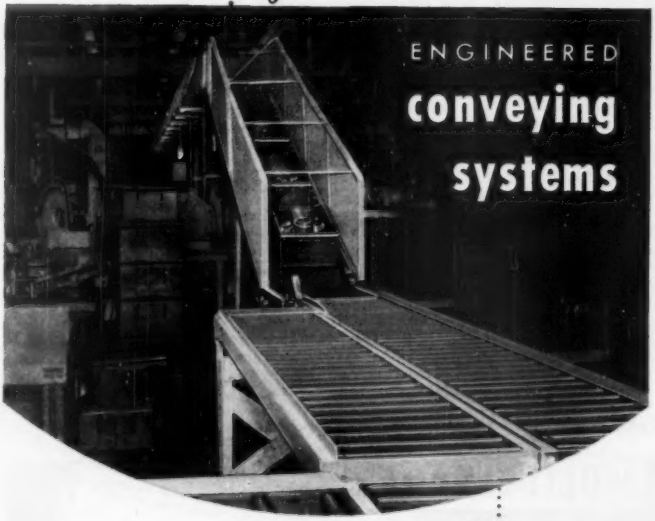
MULTI-CLEAN PRODUCTS INC

free! FLOOR MANUALS
Each for the proper care of a specific floor. Check the coupon for the manuals of your choice.

MULTI-CLEAN PRODUCTS, INC.
2277 Ford Parkway • Dept. FM1, St. Paul 1, Minn.
Gentlemen—I would like to know more about the Multi-Clean Method for my floors. Send manuals I have checked.
☐ Asphalt Tile ☐ Concrete ☐ Rubber Tile
☐ Wood ☐ Terrazzo ☐ Linoleum
☐ 9-Job Floor Machine ☐ Wet-Dry Vacuum
☐ All-Purpose Scrubber
Name and Title
Company
Address
City Zone State

ALL THE WORLD comes to Cincinnati for machine tools, pianos, radios, television sets, soap and conveying systems—
A-F *Engineered* Completely Co-ordinated Conveying Systems.

ALVEY-FERGUSON
the original-Since 1901



For a discussion of latest efficient handling methods write:

THE ALVEY-FERGUSON COMPANY
131 Disney Street, Cincinnati 9, Ohio

OFFICES OR REPRESENTATIVES IN PRINCIPAL CITIES

YOU can SEE the SUPERIORITY of ALVEY-FERGUSON Conveyor ENGINEERING

NEW AUXILIARY EQUIPMENT

Begins on page 159

to air volume. Blowers maintain constant air pressure regardless of air volume.

You can get single-stage and multi-stage models operating at 3500 and 1750 rpm. Standard outlet pipe sizes run from 4 to 24 inches—all flange fitted. Blower outlets may be oriented in any of 14 discharge positions.

Units can be adapted for use with corrosive, poisonous, or explosive gases. Smaller models (through 10 hp.) are suited for mezzanine or elevated mounting, in horizontal or vertical position.

Billmyre Blower Div., Lamson Corp., 303 Lamson St., Syracuse, N. Y.

■

Forced-Draft Conversion Burner

The Bryant forced-draft conversion burner comes factory-wired and assembled for easy ash-pit installation in furnaces or boilers. You can get the burner in 11 capacities, ranging from 400,000 to 20-million Btu. per hour input.

Standard equipment on the Model 214 includes automatic electric ignition and electronic flame-failure protection, On-Off or Throttling - Off diaphragm valves, ceramic burner face, centrifugal blower-type fan, and constant air-to-gas ratio shutter. Automatic pilot, ignition, electrode, and electronic flame rod are housed in one tubular assembly that can readily be removed for servicing.

Bryant Industrial Div., Affiliated Gas Equipment, Inc., 17825 St. Clair Ave., Cleveland 10.

Turn to page 161

Cash in Your Scrap!

Take a long look **at your over-age equipment. Sun Oil did — and found that a lot of it could be scrapped at a profit.**

ARROW
AH
HART

PUSH BU TON STATIONS

FOR EVERY CIRCUIT NEED

3 COMPLETE LINES

STANDA D DUTY

HEAVY UTY

OIL TIG

PLUS

The original ARROW-HART feature, INTERCHANGEABLE CONTROL UNITS

PUSH BUTTONS

SELECTOR SWITCHES

PUSH-PULL or PUSH-AND-TURN BUTTONS

PILOTS

BUY WITH CONFIDENCE · PROFIT BY PERFORMANCE

ARROW-HART

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY

ARROW AH HART

EXPLO-SAFE

EXPLOSIONPROOF and WEATHERPROOF MOTOR STARTERS

ALL SIZES

Sizes 0, 1, 2, 3 and 4 for Regular, Multi-Speed and Reversing Motors.

ALL LOCATIONS

NEMA Type VII, Class I, Group D (Explosive Gas and Vapors); NEMA Type IX, Class II, Groups E, F and G (Explosive Dust, Flyings and Fibers); NEMA Type IV, Weatherproof.

ALL APPROVED BY UNDERWRITERS' LABORATORIES

NOT just "conforming to" or "meeting" U.L. Specifications, but

APPROVED

SIZE 2, NEMA Type VII

AND JUST 2/3 THE SIZE AND WEIGHT OF ORDINARY STARTERS PLUS SUPERIOR PERFORMANCE, GREATER DEPENDABILITY.

"EXPLO-SAFE", the explosion and weatherproof version of Arrow-Hart's Type "RA" Starter line, now brings the advantages of this revolutionary new motor control design to hazardous and exposed locations. Space and weight savings offer new opportunities for compact control panel design and fast, economical installations. Straight-thru, front wiring means quicker hook-up, easier maintenance.

In-built features for complete arc quenching plus the special, cast Foraloy enclosures — built to resist corrosion and withstand great internal pressures — mean full protection for operator and plant. You'll find that Explo-Safe Type "RA" Starter offers more plus features in less space than any other starter on the market.

ARROW-HART TYPE "RA" MOTOR STARTERS ARE ALSO AVAILABLE IN NEMA TYPE 1 ENCLOSURES FOR ALL GENERAL SERVICE INDOOR APPLICATIONS.

SEND FOR LITERATURE, COMPLETE WITH RATINGS, DIMENSIONS, WEIGHTS AND ENGINEERING DATA.

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
HARTFORD 6, CONNECTICUT

Please send me free descriptive literature. I'd like to know more about:

- ☐ EXPLO-SAFE STARTERS
- ☐ PUSH BUTTON STATIONS
- ☐ MULTI-SPEED, REVERSING STARTERS
- ☐ TYPE "RA" MOTOR CONTROLS

NAME_____

POSITION_____

CO. NAME_____

CO. ADDRESS_____

CITY_____ ZONE_____ STATE_____

ARROW-HART

INDUSTRIAL CONTROL DIVISION

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 HAWTHORN STREET, HARTFORD 6, CONNECTICUT, U.S.A.

Branches in ATLANTA, BOSTON, CHARLOTTE, CHICAGO, CINCINNATI, CLEVELAND, DALLAS, DENVER, DETROIT, INDIANAPOLIS, KANSAS CITY, LOS ANGELES, MILWAUKEE, NEW YORK, PHILADELPHIA, PITTSBURGH, ST. LOUIS, SAN FRANCISCO, SEATTLE, SYRACUSE, TORONTO
HART & HEGEMAN (CANADA) LTD., MT. BRYDGES, ONTARIO

BUILDING MATERIALS

Expansion Joint for Copper Flashing

This 18-oz. copper joint provides for expansion and contraction of copper flashing at the base of parapet and main building walls. Maker points out that it permits the use of a prefabricated copper expansion joint where more costly and less durable methods were previously used. A prefabricated cap box (shown in hand above) comes with each expansion joint. You attach it to the cap flashing as a protective cover for the exposed half circle in the expansion joint.

Chase Brass & Copper Co., Waterbury 20, Conn.

■

TRANSLUCENT BUILDING PANELS diffuse sunlight to provide effective interior lighting. They're made of polyester resins reinforced with Fiberglas mat, come in flat or corrugated sheets. Shatterproof panels are recommended for skylighting. Resolite Corp., Zelienople, Pa.

Turn the page

You plan for plant efficiency

If heating straight jackets flexibility

You'll be interested in a Reznor system

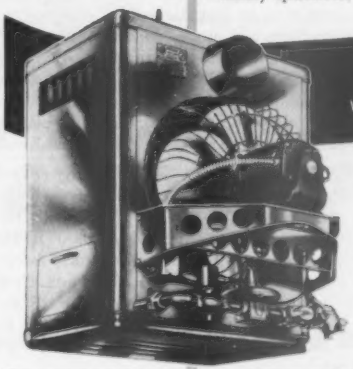
REZNOR UNIT HEATERS
permit unlimited plant remodeling and rearrangement of factory equipment

Now, more than ever, you want to be able to change your plant set-up quickly.

Don't be handicapped by fixed restrictions within the walls of your plants. Heating can be restrictive . . . unless you use Reznor gas unit heaters. With Reznors you are not handicapped by fixed capacity as with central heating. With Reznors you don't have to build heat in a big system for a few degrees of heat nor are you frozen to specific heat distribution locations.

With Reznor you add units when and where you want them; add a wing without concern to present heating facilities; remove heat use from an idle bay and not upset a heating system; locate and relocate unit to put heat impact where wanted.

Reznors cost less to install in dollars, time and structural changes. Reznors are incomparably suited to today's flexible factory operations.



REZNOR
WORLD'S LARGEST SELLING GAS UNIT HEATER

MECHANIZED HEATING

A completely automatic, packaged unit in sizes from 25,000 to 200,000 BTU. Installed singly or in multiples as required. High efficiency due to balanced engineering of heat production, air movement and controls. Both floor and suspended models available.

SEE SWEET'S CATALOG FILE

Write for Catalog

REZNOR MANUFACTURING CO.
46 UNION ST. · MERCER, PENNA.
Send me 20-page catalog in full color

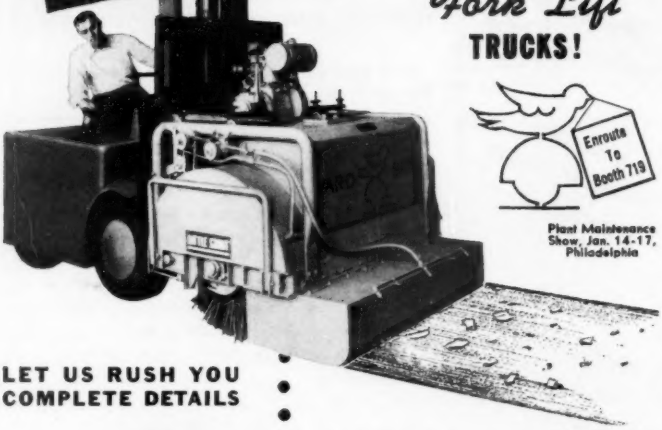
Name_____
Firm_____
Address_____
City_____ Zone____ State____

NOW

YOUR LIFT TRUCK CAN SWEEP 100,000 SQ. FT. PER HOUR!

The YARD BIRD BY LITTLE GIANT

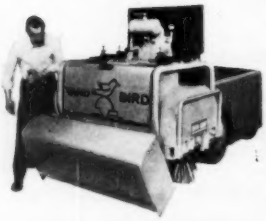
This low-cost POWERED SWEEPER FITS ALL *Fork Lift* TRUCKS!



Enroute To Booth 719

Plant Maintenance Show, Jan. 14-17, Philadelphia

LET US RUSH YOU COMPLETE DETAILS



Once you see prices and literature on the "Yard Bird," the quality construction specifications will surprise you — at this low cost. Note (above) how easily the floating dust pan is dumped, how your regular lift truck operator becomes your "Yard Bird" operator; no extra skills required. You won't be satisfied with your present methods after you see the "Yard Bird" in low-cost operation.

YOUR FORK LIFT TRUCKS can be quickly adapted to fast, large-area sweeping — indoors and out — with the new "Yard Bird" sweeper. Powered, containing its own sprinkler, it attaches to lift truck in minutes' time for use in factories, warehouses, airports, aircraft plants, railroads, stevedoring companies, etc.

This inexpensive sweeper unit covers 100,000 sq. ft. per hour (with truck traveling at 5 m.p.h.). Rugged 6.8 HP gasoline engine provides 2,400 RPM; integral clutch reduction unit keeps brush revolving at 164 RPM. FOR SNOW REMOVAL, simply adjust unit to 15 degree angle and snow is whipped off to one side!

Consider the man hour savings, initial investment savings, when you equip with the "Yard Bird"!

LITTLE GIANT PRODUCTS, INC.

DEPT. 20, 1530 NORTH ADAMS STREET, PEORIA, ILLINOIS

NEW BUILDING MATERIALS

Begins on page 161

Pouring-Type Insulation for Cavity Walls

Owens-Corning has developed a pouring-type Fiberglas for insulating cavity walls. The new Fiberglas further reduces the heat loss and moisture penetration of cavity wall construction. It also resists rot, termites, and fire.

Big feature of its new fibrous glass insulation, according to Owens-Corning, is ease of handling. The company claims that the cost of a Fiberglas-poured wall is less than that of a cavity wall with furring and lathing. And tests show that the thermal transmission is cut in half.

Owens-Corning Fiberglas Corp., Toledo 1.

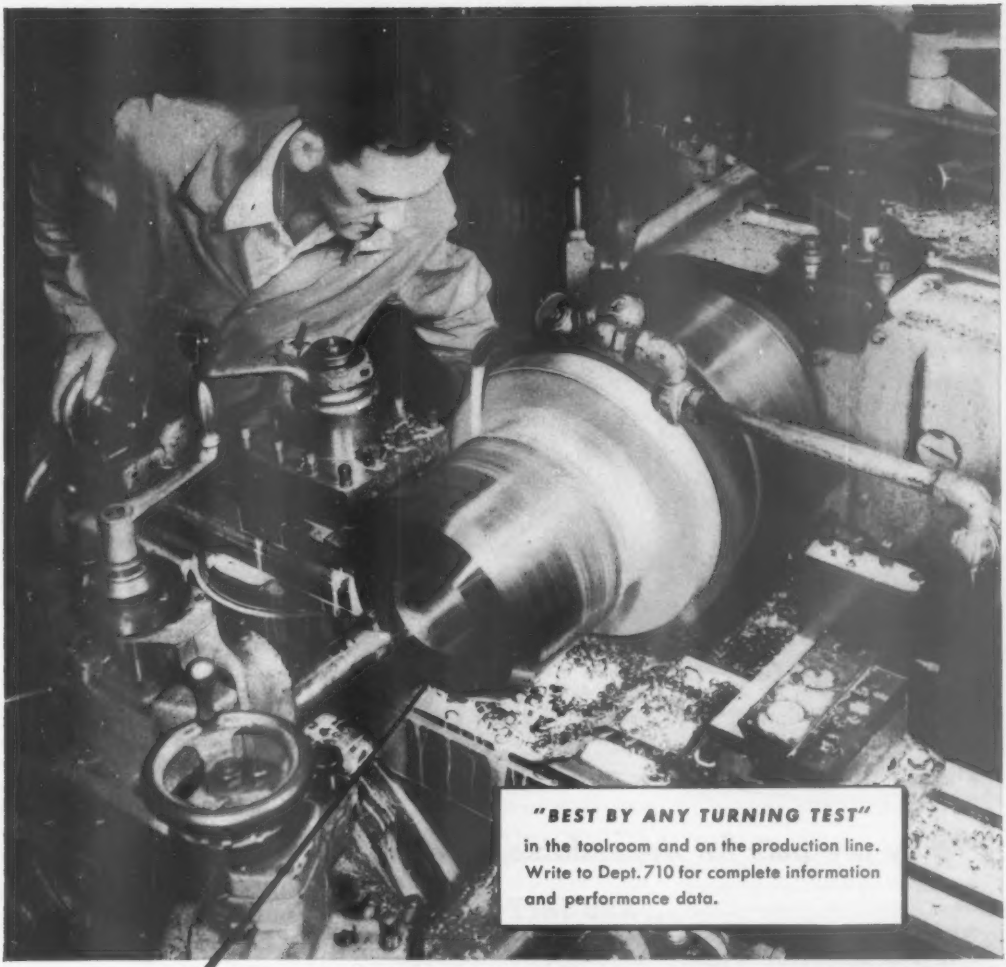
■

STRUCTURAL FLOORS will weigh less if made with vermiculite-sand concrete mix. The Zonolite Co., 135 S. La Salle St., Chicago, points out that its new mix weighs only half as much as sand concrete. This cut in dead floor weight should also cut over-all structural steel requirements. The vermiculite-sand mix requires no additional concrete topping. But maker recommends a floor covering such as asphalt tile.

Turn the page

Cash in Your Scrap!

If you can repair a broken lathe bed, do so. But if you can't, put it to work helping to make more steel for the defense program.


"BEST BY ANY TURNING TEST"
in the toolroom and on the production line.
Write to Dept. 710 for complete information
and performance data.

Jones & Lamson turret lathes are BUILT and

POWERED TO PRODUCE

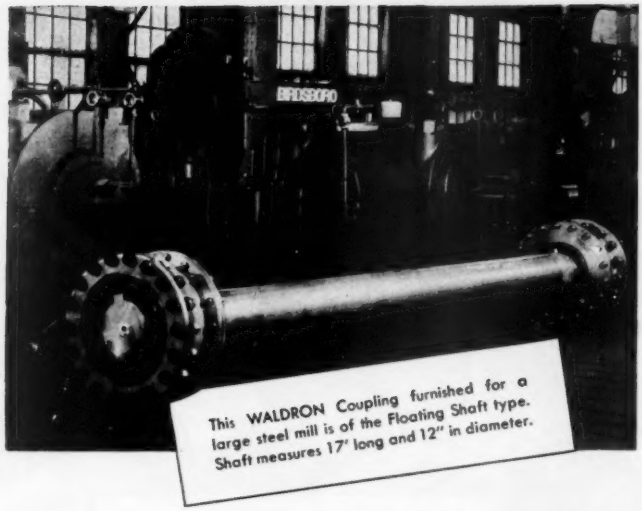
MORE CHIPS per tool
MORE PIECES per hour
MORE PROFIT per job . . . than any turret lathe of comparable size!

Turret Lathe Division **JONES & LAMSON** MACHINE COMPANY
Springfield, Vermont, U.S.A.
MACHINE TOOL CRAFTSMEN SINCE 1835

For The RUGGED Jobs...

WALDRON Improved Gear Type COUPLINGS

get the nod!



This WALDRON Coupling furnished for a large steel mill is of the Floating Shaft type. Shaft measures 17' long and 12" in diameter.

they are built for dependable service

...AND THEY GIVE IT!

Large or small—every WALDRON Coupling is designed and built with typical operating troubles in mind. Forty years of experience has taught WALDRON engineers the pitfalls to be avoided in producing a dependable coupling. The WALDRON design eliminates the usual sources of trouble; the WALDRON construction is simple and strong—forged steel parts, no welded sections, better lubrication.

The steadily growing preference for these sturdy WALDRON couplings in all major industries is a tribute to the quality and workmanship that goes into them.

Write for this Helpful Folder

explaining coupling features which give added insurance against coupling failure. No obligation.

JOHN WALDRON
CORPORATION
New Brunswick, New Jersey
Authorized Sales Representatives in Principal Cities

ELECTRICAL EQUIPMENT

Hermetically-Sealed Limit Switch

Hermetic sealing of this Electro-Snap switch is said to prevent freezing, corrosion, explosion, accumulation of dust on the contacts, tampering, and misadjustments. It's recommended for industrial use where standard splashproof or enclosed switches can't cope with extreme atmospheric or dust conditions.

The Exhibit Supply Co., 4218 W. Lake St., Chicago.

■

Magnetic Amplifier Speed Control

Precise control of motor speed with no maintenance problems is the big claim for the new E-M Regutron magnetic amplifier control. The new controller works with an E-M adjustable-speed magnetic drive, an electromagnetic torque transmitter that provides a variable output speed from constant speed motors.

Big feature of the magnetic amplifier is the elimination of complicated electronic circuits. The amplifier has no moving

Turn the page

Since 1883

FOR REALLY *TOUGH* PAINT JOBS

TROPICAL

heavy-duty MAINTENANCE PAINTS

Do you have a really tough maintenance paint job? To thousands of maintenance men and plant managers just such a problem paint job was their first introduction to the remarkable durability of Tropical paints . . . which are formulated strictly for heavy-duty maintenance service. There is a complete line of fresh-mixed Tropical paints, each designed to give superior performance. Whether the application must resist acid fumes, alkalis, rust or heat—on metal, masonry, wood or concrete—on floors, walls, ceilings, roofs, machines or equipment, the right Tropical paint has proved it can do the job better! To select the right paint for the job, in the right quantity, and for correct method of application, use the expert service of the Tropical maintenance paint specialist in your community. Write us today!

THOUSANDS OF PLANTS USE TROPICAL

Where excessive heat, corrosion and fumes quickly destroy ordinary maintenance paints, Tropical has demonstrated superior durability. The list of applications where Tropical outlasts ordinary finishes is almost endless . . . steam pipes, boilers, stacks, pumps, storage tanks, pickling installations, steam chests, electrical equipment, structural steel and masonry. Tropical's heavy-duty paints, tailored to industry's needs, give outstanding service!

SINCE 1883

HEAVY-DUTY MAINTENANCE PAINTS

TROPICAL

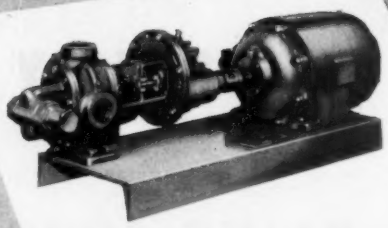
SUBSIDIARY OF PARKER RUST PROOF COMPANY

MAKERS OF Bonderite PARKER RUST PROOF QUALITY CORROSION RESISTANT

FREE! Send for your copy of the "Industrial Paint Index"—a quick, convenient reference chart for a multitude of maintenance paint applications.

TROPICAL PAINT & OIL COMPANY • 1122-1300 West 70th St., Cleveland 2, Ohio

EFFICIENCY + PLUS



THE DEPENDABLE ROPER

FOR GENERAL PURPOSE PUMPING

What do you expect of the pumps you install? Efficiency, dependability, endurance, simplicity, an unusually high record of performance? If these are your requirements, by all means investigate the Roper 3600 Series; pumps that are engineered to do a wide range of jobs handling both thick or thin clean liquids.

At this very moment the interests of tank truck operators, refineries, bulk stations, process plants and general industries are being served by thousands of Ropers. The size for your needs can do an equally productive job for you!

OUTSTANDING FEATURES...OUTSTANDING PERFORMANCE

Pumping liquids from A to Z calls for quality-made components accurately assembled. Series 3600 pumps feature hardened helical pumping gears; heavy duty, high-lead bronze bearings; adjustable relief valve (from 20 to 90 P.S.I.); split packing gland; one-piece case of practical design. Standard or special fitted models available. Pressures to 60 P.S.I. — capacities 40 to 300 G.P.M.

Send Today For "HOW TO SOLVE PUMPING PROBLEMS"

FREE ON REQUEST

SEE OUR CATALOG IN SWEET'S

ROPER Rotary Pumps

GEO. D. ROPER CORP.
181 Blackhawk Park Ave.
ROCKFORD, ILLINOIS

NEW ELECTRICAL EQUIPMENT

Begins on page 164

parts. It uses a saturable core reactor to provide stepless control of speed within ± 0.5%.

E-M magnetic drives come in ratings of 25 hp. and higher in standard motor speeds. Applications include fans, centrifugal pumps, and compressors.

Electric Machinery Mfg. Co., 821 Second Ave. S. E., Minneapolis 14.

■

Outdoor Motor Controls

Westinghouse's new raintight motor control can be used in a wide range of outdoor jobs. The unit is a combination circuit breaker and across-the-line starter. It comes with either a built-in Start-Stop pushbutton or a Hand-Off-Auto selector switch.

The sheet-steel enclosure is Bonderized for maximum corrosion resistance and finished in gray enamel. A Neoprene cover gasket and a protective shield at the top of the enclosure keep out the rain.

Designated as Class 11-206-NR, these starters are available in NEMA sizes 1 through 5. Controls operate at 220 or 440 volts, 60 cycles. But with special coils they can be adapted to 600 volts.

Westinghouse Electric Corp., Box 2099, Pittsburgh 30.

■

New Joint Design for Feed-In Duct

New joint design in Square-D feed-in duct is said to reduce installation time and effort. You no longer have to match left- and right-hand duct ends. In the new system they are identical.

Factory-installed joint bolts face outward for accessibility. Only tie plates and nuts are needed to complete the joint.

Square D. Co., 6060 Rivard St., Detroit 11.

Turn the page

"Tycol Acylkup boosts bearing life... smooths the way for heavier loads"

Of course! Tycol Acylkup Bearing Grease "stays put" . . . keeps anti-friction bearings running smooth and cool. Finest quality neutral oils give it high load-carrying capacities. Tycol Acylkup is firmly resistant to the washing action of water. Its dependable lubricating abilities lengthen bearing life and reduce maintenance costs. Call your nearest Tide Water Associated office for further information.

TYCOL

INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco

TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE · NEW YORK 4, N.Y.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

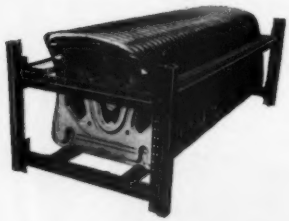
SAVE HANDLING TIME..

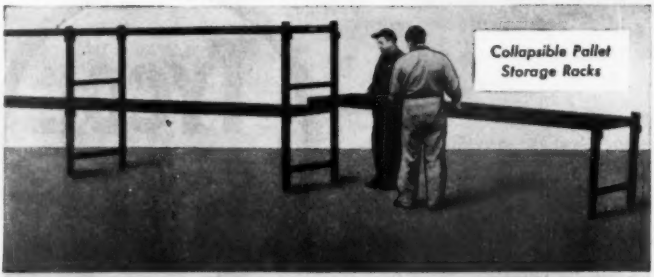
AVOID CONFUSION...

FACILITATE STORAGE..

The MHS Work Carrier is a sturdy, flexible device for the transfer, storage or shipment of work parts or sub-assemblies. Stacked vertically, by means of the nesting plugs at the corners, these units constitute a rigid storage bin structure. Mounted on casters, they serve as factory trucks for the transfer of parts between processes. They are easily handled by the conventional lift truck or crane.

Write for Catalog R2 for detailed specifications.





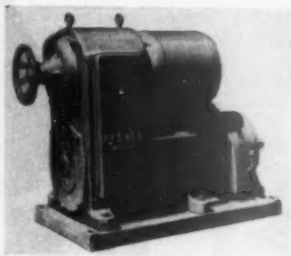
Mechanical Handling Systems, Inc.

4600 NANCY AVE. • DETROIT 12, MICH.

Offices in Principal Cities

NEW ELECTRICAL EQUIPMENT

Begins on page 164



Variable Speed Drive

The Reeves Model No. 8000 is a self-contained variable speed power plant. It combines a speed-varying mechanism, a constant-speed motor of the customer's choice, and a built-in helical gear reducer (when low output speeds are required).

You can get speed ranges from 2:1 to 6:1. Handwheel control is standard; electrical or completely automatic hydraulic controls are optional. Unit comes in horizontal and vertical designs.

Reeves Pulley Co., Inc., Columbus, Ind.

■

Motor Control With Side-by-Side Components

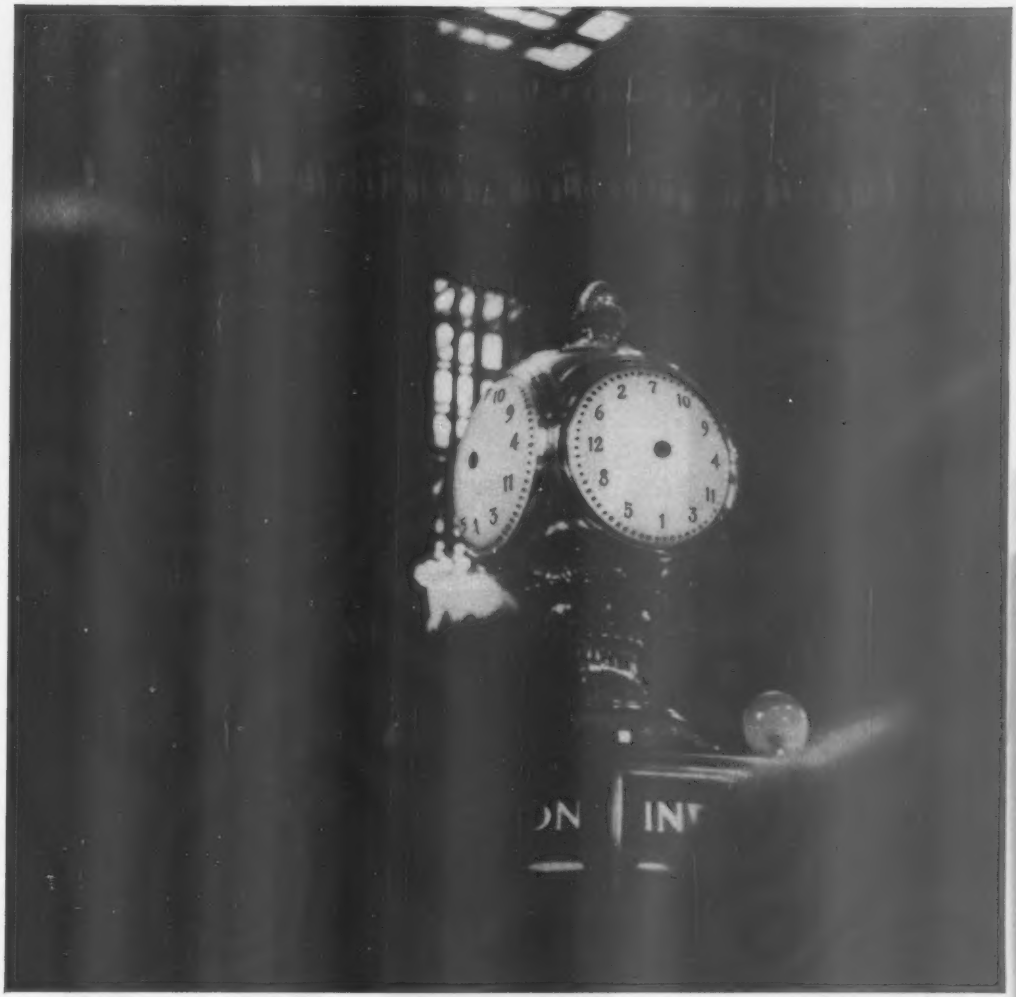
Components are mounted side by side in a new Westinghouse combination across-the-line motor starter and circuit breaker. You can use it wherever space requires it. It's shorter and wider than the standard vertical type control.

Starter has self-indicating handle similar to the standard vertical-mounted control. The handle has separate positions for On, Tripped, Off, Reset, and Open Cover. It will take up to three padlocks.

You can get this starter in sizes 0, 1, and 2 in sheet steel enclosures for NEMA Types I, IA, and V.

Westinghouse Electric Corp., Box 2099, Pittsburgh 30.

Turn the page



What happened to the time?

A lot of things are scarce these days.

Steel. Aluminum. Machine tools. Raw materials. So scarce, in fact, that Uncle Sam has them on a priority list.

But in American industries today, the scarcest commodity of all is . . . *time!*

With military orders urgent, with complex new weapons in the making, *time* is the key word of our defense program.

But there's one way a manufacturer can get a "priority" on *time.*

He can ship his parts and products via Air Express—the service that gets *top priority* of all commercial shipping services!

Air Express is first off the loading platform . . . first on the planes . . . first to arrive at destinations anywhere in the 48 states!

Whatever your business, you can profit from the regular use of Air Express. Here's why:

IT'S FASTEST — Air Express gets *top priority* of all commercial shipping services — gives the fastest, most complete door-to-door pick-up and delivery service in all cities and principal towns at *no extra cost.*

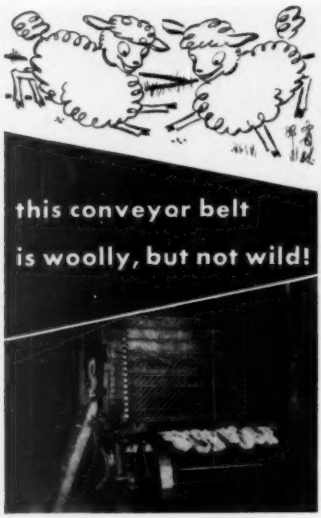
IT'S DEPENDABLE — Air Express provides one-carrier responsibility all the way and gets a *receipt upon delivery.*

IT'S PROFITABLE — Air Express service costs less than you think, gives you many profit-making opportunities.

For more facts, call Air Express Division of Railway Express Agency.

AIR EXPRESS

GETS THERE FIRST



That's a true turnabout for this example of a specially designed Cambridge woven wire conveyor belt. This one carries wet, washed wool through a drying oven to remove moisture and washing chemicals from the fibre. There's no wild belt travel because the Cambridge Chain Drive design used here prevents the belt from riding from side to side across the pulleys . . . maintains straight belt movement.

Open mesh of the wire belt permits free, even heat circulation. All-metal construction gives longer belt life and lower maintenance costs.

Cambridge Chain Drive Attachment

Whether you're processing textile fibres, foods, chemicals, metal or ceramic products, a Cambridge woven wire conveyor belt can help you cut production costs and maintain product uniformity by combining movement with processing. But don't have the wool pulled over your eyes on conveyor belt design . . . be sure to call in your Cambridge field engineer for his recommendation on the proper—

CAMBRIDGE WOVEN WIRE CONVEYOR BELT —any metal or alloy, mesh or weave.

Write direct or look under "Belting-Mechanical" in your classified telephone directory.

FREE BELT MANUAL contains information on conveyor and belt design and specifications, metallurgical data and belt maintenance. Write for your copy today.

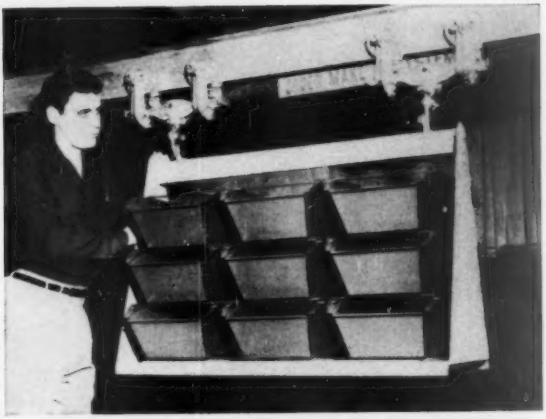
The Cambridge Wire Cloth Co.

Dept. E • Cambridge 1, Md.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

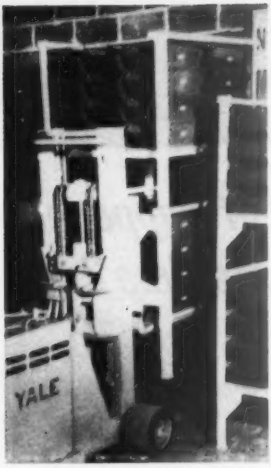
MATERIALS HANDLING



1 TROLLEY CAR for order assembly is just one of the new handling devices specially tailored to the Nestier tote box. Complete line gives you a materials handling system to keep . . .

Tote Boxes on the Move

2 WOODEN DOLLY handles boxes on short hauls and . . .



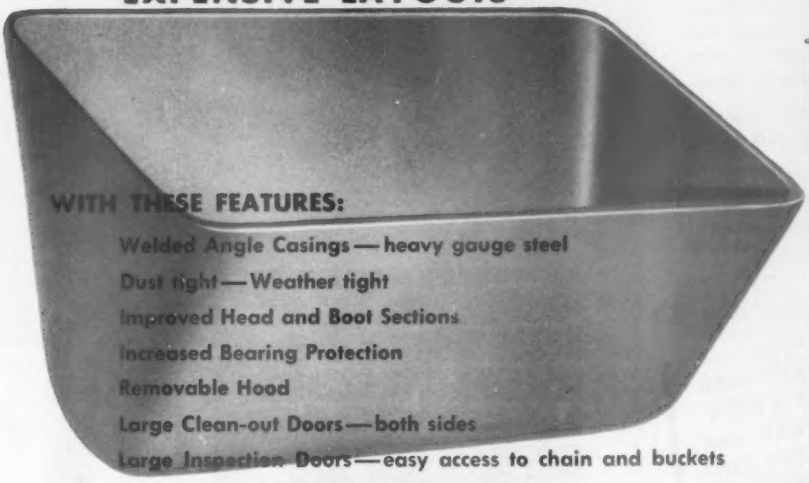
3 STEEL RACK moves them in and out of storage.

Turn the page

BUCKET ELEVATORS

STANDARDIZED...

TO SAVE YOU MONEY, TIME, AND EXPENSIVE LAYOUTS



WITH THESE FEATURES:

- Welded Angle Casings — heavy gauge steel
- Dust tight — Weather tight
- Improved Head and Boot Sections
- Increased Bearing Protection
- Removable Hood
- Large Clean-out Doors — both sides
- Large Inspection Doors — easy access to chain and buckets
- Take-ups furnished for Head or Boot if desired
- Self-aligning, plain or anti-friction Bearings

A Jeffrey Centrifugal Discharge Bucket Elevator is shown here. Also Perfect Discharge, Vertical Continuous and Inclined Elevators — buckets mounted on chain or belt — can be supplied in standard sizes.

You'll be ahead with Jeffrey Bucket Elevators — they're backed by years of engineering experience and hundreds of installations. A standard type and size to meet most requirements — complete drawings available — special designs for unusual applications. We will be happy to give you more details.

Bin Valves · Car Pullers · Conveyors · Crushers · Coolers · Dryers
Feeders · Idlers (belt) · Packers · Pulverizers · Screens · Shredders
Weigh-feeders · Transmission Machinery

JEFFREY

ESTABLISHED 1877

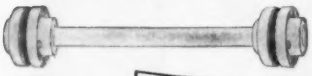
Complete Line of Material Handling, Processing and Mining Equipment

THOMAS
Flexible ALL METAL
COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

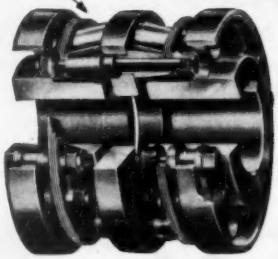
Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years



BACKLASH
FRICTION
WEAR and
CROSS-PULL
are eliminated
Lubrication is not required!

PATENTED FLEXIBLE DISCS



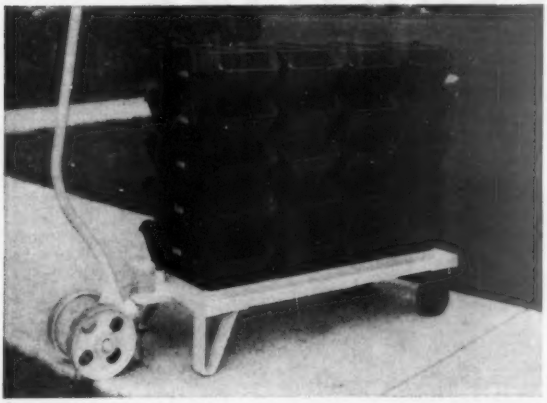
THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

NO MAINTENANCE PROBLEMS.

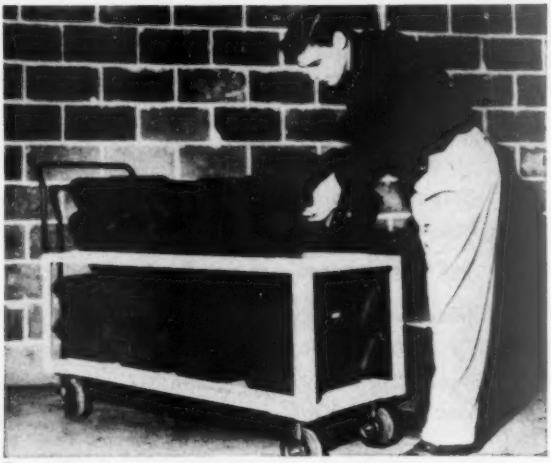
ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA



4 JACK LIFT TRUCK spots Nestiers in production areas and . . .



5 CASTER WAGON moves repair parts to maintenance jobs.

Tote Box Handling System

The Doepke Mfg. Co. first designed itself a good tote box—the Nestier. It nested, stacked, and provided 2-way entry.

Now they have come up with a series of trucks and adapters that turn the Nestier into a complete materials handling system. Chances are you can find one of these new handling devices to move Nestiers through just about any plant operation.

You see some of the Nestier handlers above and on page 170. In addition you can get special caster trucks, adapters for moving Nestiers individually on overhead asesmbly lines, and cardboard inserts for dividing Nestiers into separate compartments.

Charles William Doepke Mfg. Co., Rossmoyne, Ohio.

Turn the page

IN SAFETY SWITCHES—Marlin-Rockwell Corporation's ball bearing factories use 30 ampere HCI switches as disconnects for high frequency motors used to power internal grinders. HCI interior is removable for easy wiring and inspection. No exposed live parts when switch is OFF and door open. Underwriters' Laboratories Approved.

IN COMBINATION STARTERS—Rugged, simple construction of HCI is perfectly adapted to use as disconnect in combination starters.

SAFE LOAD BREAKING

with Unique "Arc-Quench" Action

For the first time in a safety switch, magnetic repulsion is used to break load quickly, safely.

In Trumbull's HCI (High Capacity Interrupter) Type A switch, double-break contacts are projected and withdrawn with piston-like speed and force. The arcs repel each other and strike against grid pins, breaking into smaller arcs which cool rapidly.

The unique arc-quenching action provides safety, lengthens contact life by preventing pitting, and gives the switch much greater life expectancy. HCI withstands heavy short circuits without damage.

Its initial success as a safety switch has led to its adoption for use as disconnect in combination starters, control centers and switchboards.

Write for Bulletin TEC-10 which describes the HCI fully.

IN SWITCHBOARDS AND CONTROL CENTERS—Compact 30 and 60 ampere HCI switch interiors can be mounted in twin switchboard units (100 ampere HCI takes same vertical space), saving trough space and providing dependable short-circuit protection and sure ON-OFF handle indication.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY

PLAINVILLE, CONN.

Telescribers can help you beat shortages

Faced with the shortages that occur when industry mobilizes to meet a national emergency, manufacturers once again must fully utilize all their available manpower and material.

Full utilization rests on the ability of the manufacturer to maintain absolute control over production, quality and material. This can only be done effectively where rapid, accurate intra- and inter-plant communication exists. Your plant can benefit by such communication through TelAutograph Telescriber Service.

TelAutograph telescribers transmit messages (in the sender's own handwriting) over wire *instantly* to one or many outlying points. No time is wasted waiting for contact. The telescriber receiver displays the written message until it is noted and removed. No costly delays result from misunderstood orders. It serves as a permanent record of the communication.

To find out how TelAutograph telescribers can save time, material and money in your plant operation, write Dept. B-21.

TelAutograph CORPORATION

16 West 61st Street
New York 23, N. Y.

Telescriber Service TelAutograph

When writing for information, ask for details on the newest telescriber feature—simulated forms on your plant's telescriber transceivers.

"Handwritten Messages Deliver Themselves . . . While You Write"

MATERIALS HANDLING EQUIPMENT

Begins on page 170

Drum-Handling Device for Fork Trucks

Here's a drum handler for anybody's fork truck. You can attach this Yale handler to any of your fork trucks without removing the forks or making any hydraulic or mechanical connections.

The device automatically picks up one or two standard drums. Spring-loaded clamps snap under the lip of the drum when the handler is lowered into position. When the drums are lifted, drum weight locks the clamps in place. When the drums are deposited, the operator slowly inches the truck forward to free the clamps from the drum automatically.

The Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15.

■

Tractor Cab

An all-weather cab for Mercury heavy-duty gasoline tractors can be quickly installed in the field. Unit is shipped knocked-down, requires 24 bolts to secure it to the tractor frame. The Mercury people say two men can do the job in two hours.

Cab has shatterproof windshield, electric windshield wiper, canvas roll-down curtains, celluloid side and back windows, and a 12-gage all-steel body.

The Mercury Mfg. Co., 4044 S. Halsted St., Chicago 9.

Turn the page

A Profitable Partner For You

YOUR B-RIGHT-ON SOCKET SCREW DEALER

IF you're a user of socket screw products, there's a man in your community you should know . . . your Brighton dealer. He holds his Brighton franchise because he's wise to the ways of socket screws . . . understands their uses and applications and can be really helpful to users of Brighton products.

He's well able to give prompt service to you because he maintains adequate local stocks of Brighton screws. And besides, he has the centrally located Brighton factory stock to back him up. His line of Brighton screws is a true quality line . . . up to your standards of accuracy, uniformity and every other requirement.

You'll find your Brighton dealer will make a profitable member of your production team . . . call on him whenever there's a question on socket screws. Write for the name of your nearest Brighton dealer.

Socket Screw Products of All Kinds

THE **BRIGHTON**
SCREW & MANUFACTURING CO.

The grinding department has them stepping!

SIMONDS ABRASIVE CO.

Grinding Wheels

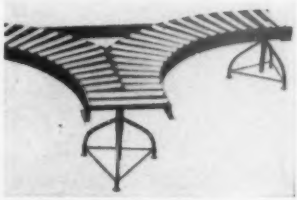
More assemblers needed . . . and it's simply a matter of cause and effect. The cause—Simonds Abrasive Company Grinding Wheels! The effect—more production turned out faster. Put more "prod" in *your* production with Simonds Wheels. They're part of a complete line including grinding wheels of all shapes and sizes, mounted wheels and points, segments and abrasive grains . . . accurately specified for your jobs . . . and made by Simonds Abrasive Company, a major grinding wheel producer for almost 60 years. Write for grinding data book and name of your distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON; DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd - Arvida, Que.

MATERIALS HANDLING EQUIPMENT

Begins on page 170



Converging Section for Roller Conveyors

You can spot this Convergo section in your handling system wherever two conveyor lines run into one. Units are designed for all widths of roller conveyors from 6 to 36 inches. Special units manufactured on order.

Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.

■

Sheet-Handling Truck

The Market Forge sheet handler can be moved by hand or hauled by tractor over woodblock or concrete floors. Floor locks on either side of the truck keep it stationary during loading. Wide-faced rubber wheels in the center cushion the load.

There are seven openings, each 4⅜ inches wide. Sheets ride smoothly on ball-bearing rollers fitted into the truck deck. Truck capacity is 6000 pounds. Truck is 3 feet wide, 8 feet long, 6 feet high.

The Market Forge Co., 25 Garvey St., Everett, Mass.

Turn the page

Only with B. F. Goodrich grommet belts can you make these savings!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

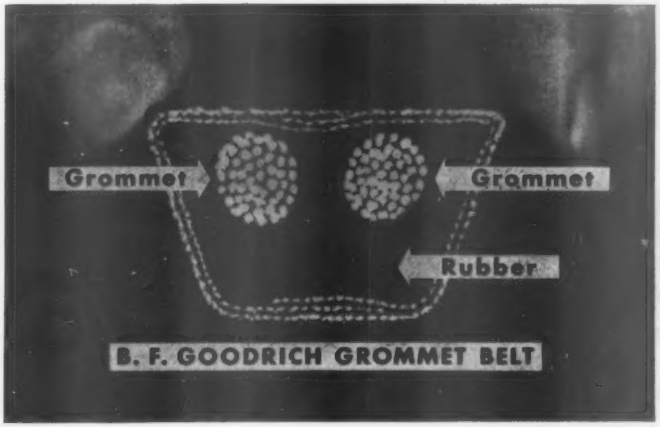
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. FM-1
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

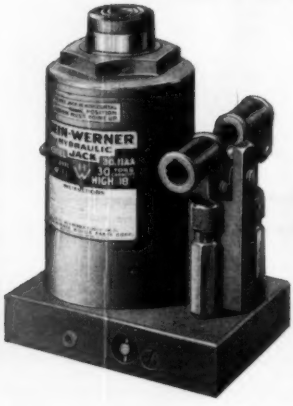
State_____

A manpower saver . . . . . .

HEIN-WERNER HYDRAULIC JACK

enables one man to move heavy machines . . . no helpers needed

You can't beat the low cost, time saving efficiency of a Hein-Werner industrial jack. This versatile package of hydraulic power is great for moving heavy equipment, and for pushing, lifting, bending operations in plant maintenance work.



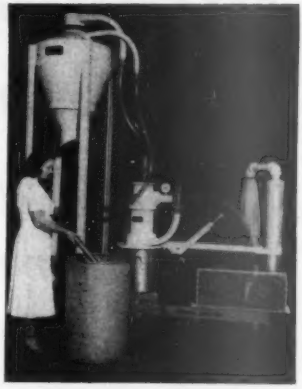
These compact, dependable jacks are made in models of 1½, 3, 5, 8, 12, 20, 30, 50 and 100 tons capacity. See your industrial supply distributor or write us for complete details.

Hein-Werner HYDRAULIC JACKS

HEIN-WERNER CORPORATION
Waukesha, Wis.

MATERIALS HANDLING EQUIPMENT

Begins on page 170



Portable Air Conveyor for Re-Filling Hoppers

You can replenish machine supply hoppers and bins periodically with this portable air conveyor. The equipment is designed to transfer powdered products and granular material.

Complete installation includes a truck-mounted air conveyor and separate receiver tanks for each bin or hopper to be serviced. The conveyor picks up material from original drums or containers and sends it into the receiver tanks over each supply hopper.

The rubber-tired hand truck has a rotary blower, separator and dust hopper, and flexible air hose. There's also a cyclone separator on each receiving tank. Truck weighs 1040 pounds, measures 66x30 inches, 65 inches high.

The Powerad Co., 79 Madison Ave., New York 16.

■

NEW CONVEYOR BELTING of Raybestos-Manhattan, Inc., Passaic, N. J. is engineered to handle jobs too tough for conventional duck belts. Maker recommends it for use where pulleys are small, where thick, narrow belts are needed, or where there is danger of tearing or puncturing.

Turn the page

HIP POCKET CONTROL PROTECTION!

Sure . . . this Westinghouse Renewal Parts Kit gives you a complete set of normal wearing parts that's on hand and ready to go when you need Motor Control contact maintenance—and need it in a hurry.

Moving contacts, moving contact springs and stationary contacts . . . they're all in one place and clearly labeled so that they can be found quickly. The cost for a Renewal Parts Kit is considerably less than when you buy the parts separately, not counting the paper work and the time spent fumbling for parts, that you save.

Three types of Kits are all that are needed for the average plant for all classes of N. E. M. A. sizes 0, 1 and 2 starters . . . instead of package after package of spare parts as before. And, by ordering a new Renewal Parts Kit as soon as one on hand has been used, you don't chance breakdowns tying up valuable equipment at any time.

For complete information call your nearest Westinghouse Distributor or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-30088

YOU CAN BE SURE... IF IT'S

Westinghouse

Life-Linestarter

RENEWAL PARTS

Here's How

Thompson Products, Inc.

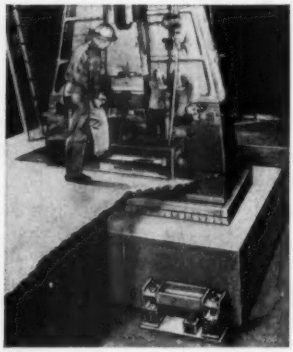
INCREASED PRODUCTION WITH STRAIGHT-LINE WORK FLOW.

. . . by Controlling Hammer Shock

Thompson Products, Inc., manufacturers of automotive, aircraft, and electronic precision parts, found that hammer vibration made accurate work on nearby grinders impossible. In fact, a new building was planned to segregate the hammers from the grinders, sacrificing the benefits of straight-line production.

However, Korfund spring-isolated hammer foundations completely solved the problem — permitted use of the hammers and grinders side by side for maximum production. And no new building was needed.

Materials handling costs were cut, construction costs reduced, hammer and worker efficiency increased, and maintenance costs on hammers, grinders, and buildings were reduced.

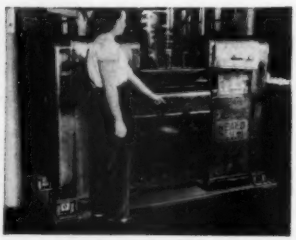


Typical spring-isolated foundation for a 2500# steam hammer. Tests prove there is actually a slight increase in hammer blow efficiency. Shock isolation is so complete that a coin will remain standing on edge beside the foundation as maximum blows are struck!

. . . by Shock Mounting Machine Tools

For maximum work-flow on piston machining lines, Thompson installed two automatic boring machines 10 feet apart. With both machines operating, shock transmitted from one to the other caused intermittent skips and gouges.

One machine had to be kept idle until they were both mounted on Korfund steel spring Vibro-Isolators. Now they operate together and turn out perfect work. Yet the cost of Korfund complete isolation was little more than with less effective methods.



Today's automatic machine tools, built to perform several operations in sequence, pay off in high production to close tolerances when protected from external disturbances.

You will find Korfund data sheets in Sweet's Mechanical Industries, Process Industries, Engineering, or Architectural Files. We'll also gladly supply complete information and recommendations, without obligation. Just contact us, or the Korfund representative you'll find in most principal cities. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS · RUBBER · CORK

Representatives in Principal Cities

THE KORFUND COMPANY, INC.

48-35C Thirty Second Place • Long Island City 1, N. Y.

MATERIALS HANDLING EQUIPMENT

Begins on page 170

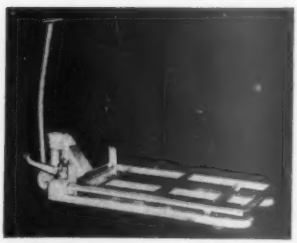
Custom-Made Baskets for Precision Parts

A nesting frame plus custom-made inserts make the Eezy-Stak basket a good handler for precision parts. You can have the inserts made to fit just about any size or shape of part. The insert is permanently welded to the wire frame.

Eezy-Staks are made of steel wire, flat expanded metal, wire mesh, or perforated metal. Baskets are cadmium plated. And maker says they are easy to handle, store, and stack.

Wire & Iron Products, Inc., 1725 16th St., Detroit 16.

■



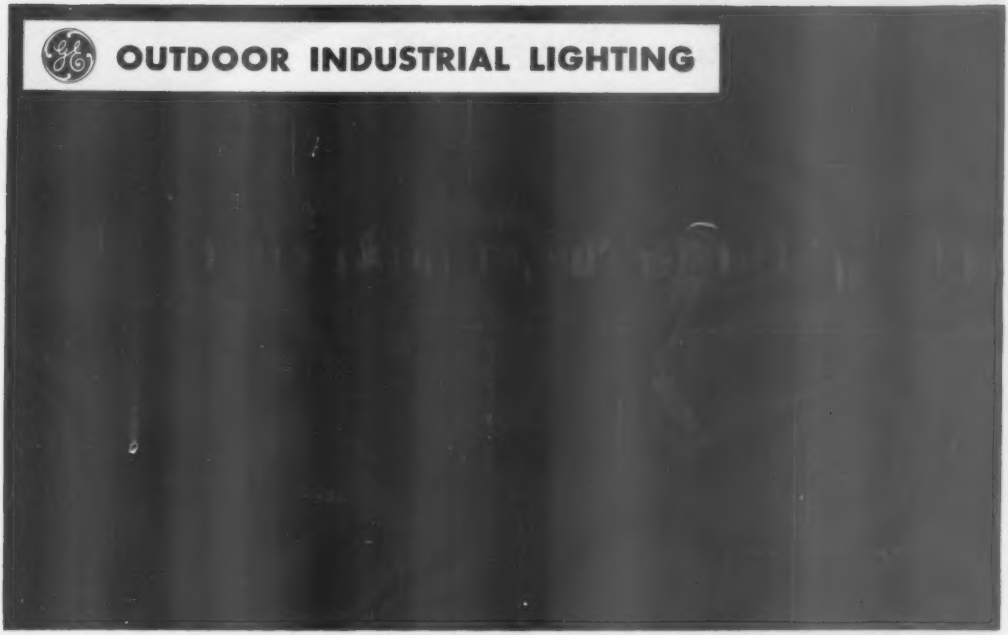
Skid Adapter for Pallet Truck

A skid adapter enables this Raymond pallet truck to handle skid platforms as well as pallet loads. The hinged adapter frame can be raised out of the way when handling pallets or lowered into position when handling skid platforms.

The Raymond Corp., 3285 Madison St., Greene, N. Y.

Turn the page

OUTDOOR INDUSTRIAL LIGHTING



Inadequate lighting such as this makes it difficult to guard your plant boundaries properly. For a moderate investment most plant protective lighting systems can easily be modernized and made much more effective.

Now, plug up the loopholes in your outdoor lighting

A continuous, well-planned system can double the protection offered by fences and walls. Plan now to give your plant the protection of a complete lighting system.

As the need for protection increases, as you move back into two- and three-shift schedules, a modern outdoor lighting system becomes more and more important to your production picture.

FOR PROTECTION, investigate the low-cost benefits of a soundly planned protective lighting system. New techniques, new types of fixtures, or minor adjustment of your present equipment can bring your lighting up to date for a very moderate investment.

FOR SAFETY in handling outdoor traffic, look into today's techniques of improved area lighting for loading platforms, docks, parking facilities, and roadways.

FOR INFORMATION on outdoor lighting, contact the lighting specialist at your local G-E office, or write for the free bulletin, "Outdoor Lighting for Industrial Plants." Address Section 451-165, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

451-165

Plant managers need to know more about wood!

Send for free booklet
"Pointers on Penta"

The Dow Chemical Company
Dept. PE-1B
Midland, Michigan

Name_____

Title_____

Company_____

Address_____

City_____ State_____

DOW
Penta
chlorophenol

Die Handling Unit for Fork Truck

A power winch in the battery compartment makes this Baker JOM fork truck an efficient die handler. Maker says this arrangement does not interfere with the truck's hauling and tiering efficiency. Winch unit comes on Baker 7000-, 8000-, and 10,000-lb. trucks.

Baker Industrial Truck Div. The Baker-Raulang Co., 1250 W. 80th St., Cleveland 2.

■

Yard Hoists

Latest line of King hoists can be used with either gasoline, diesel, or electric power units. Hoisting control is obtained through an oversize, hydraulically operated clutch. External contracting 3-in. band brakes provide stopping power.

Model 2500-H, powered by a 25-hp. gasoline engine, has a standard capacity of 6000 pounds at 100 fpm. Model 1300-H powered by a 13-hp. engine has a standard lift of 3000 pounds at 100 fpm. Through gearing changes you can vary speeds and ca-

How much **can you save in your shipping room?**

SEE HOW THIS SCHOOL BOOK DISTRIBUTOR CUT HIS CARTON-SEALING COSTS 70%

1. HE USES A BOSTITCH FOOT-POWERED BOTTOM STAPLER to make up corrugated cartons three times faster than taping and gluing. Bostitch staples also give him stronger, neater packages . . . No more postal complaints because of improper sealing . . . no more book rejections because of smudges from glue and tape. His shippers, too, prefer Bostitch stapling over the taping, gluing, string-tying and wire-binding methods formerly used. For the same reasons, it will pay you to investigate the cost-cutting possibilities of Bostitch stapling in your shipping room.

2. HE USES A BOSTITCH HEAVY-DUTY STAPLER — equipped with a long, thin sealing blade — to top-seal his bulky shipping cartons. Also three times faster than gluing and taping.

3. HE USES A BOSTITCH PLIER-TYPE STAPLER to seal corrugated wrap-around packages for single-book shipments . . . and saves time, money, and labor. Eliminates need for made-up mailers.

ATTACH THIS COUPON TO YOUR LETTERHEAD and find out how Bostitch stapling machines help make unskilled workers more productive . . . provide a self-inspecting fastening method . . . cut many fastening costs. Over 800 models to fit your needs exactly. 300 field men in 112 cities in the U. S. and 11 cities in Canada to give you nearby service.

BOSTITCH®
fastens it better AND FASTER with wire
ALL TYPES OF MACHINES FOR APPLYING STAPLES
ALL TYPES OF STAPLES APPLIED BY MACHINES

BOSTITCH, 404 Mechanic Street, Westerly, R. I.

Please send me your new, free Bulletin 267 — "How Bostitch Can Save You Time and Money in 12 Important Shipping Room Operations."

Name..... Title.....

Firm.....

Street.....

City..... Zone..... State.....

Nothing could be cleaner!

MODERN, SPOTLESS COCA-COLA OFFICE AND BOTTLING PLANT DuQuoin, Ill.

®Janitrol

GAS-FIRED* UNIT HEATERS SERVE EVERY DEPARTMENT

In this typically spotless, 1½ million dollar Coca-Cola building, 45 Janitrol Unit Heaters deliver dependable, clean, automatic gas heat where it is wanted . . . when it is wanted. The complete Janitrol line of sizes and model types made it practical to standardize on Janitrol throughout the entire plant . . . for instance, a corner of the stock room only required a 50,000 Btu/hr. Unit, while a 450,000 Btu/hr blower heater was required in the huge basement storage room.

Whatever your heating needs, one unit or many, you can depend on Janitrol equipment and engineered installation to bring you low-cost, carefree heating.

*Janitrol Unit Heaters operate on natural, manufactured, mixed or LP Gases.

Surface Combustion Corporation • Toledo, Ohio

Other Products—Surface Industrial Furnaces, Kathabar Humidity Control Systems, Aircraft Heaters

Begins on page 170

pacities of these two models over a wide range.

You can get multiple drum units at additional cost. All drums have ample space for wire rope.

King Mfg. Corp., 3146 W. Chicago Ave., Chicago 22.

■

Remote Control for Fork Trucks

A remote control attachment for any Baker fork truck permits the operator to control fork action at a distance from the truck's control panel. This device permits one man to re-lamp fluorescents from platform mounted on the truck forks. And it helps the truck operator get at hard-to-reach stock bins.

Fork action is controlled by a small pushbutton unit held in the operator's hand. During normal operation the remote control unit clamps on the truck's upright. There's enough reel-mounted cable to reach to the truck's standard lift limit.

Baker Industrial Truck Div., The Baker-Raulang Co., 1250 W. 80th St., Cleveland 2.

Turn the page

Cash in Your Scrap!

Scrap is often a safety hazard when you leave it laying around the plant. The steel mills need it.

Three big quality points make great file-teeth points

THE pointed shape you see here in greatly exaggerated size is that of a typical Nicholson file tooth made from Nicholson-specified high-carbon steel — the most practical of all materials for files.

The mottled area is part of a photomicrographed cross section of the file *after hardening*. Note the myriad of fine white particles — technically known as iron carbides . . . and of extreme hardness. Their quantity, size and uniform distribution are carefully controlled in Nicholson's metallurgical practices to assure maximum hardness (C66-67) and best wearing properties.

The extreme sharpness of Nicholson files accounts for their fast cutting ability. This sharpness is controlled by scientifically relating the cutting angles and impact of the teeth-raising chisels to the annealed hardness of the high-carbon steel file blanks. Nicholson carefully controls its annealing practice so that the iron carbide particle size and distribution are "just right" for best sharpness.

Nicholson and Black Diamond files are sold by industrial distributors who want to make sales by meriting them—through dependable products and good service.

***"FILE FILOSOPHY"**—Nicholson's famous illustrated 48-page book on manufacture, kinds, use and care of files—is yours for the asking . . . in as many copies as you need for interested key men.*

NICHOLSON FILE CO., 27 ACORN ST., PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON FILES FOR EVERY PURPOSE

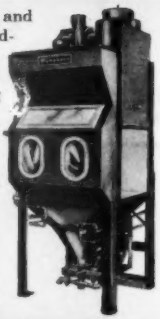
Here's BIG NEWS

Blast Cleaning Unit is PORTABLE!

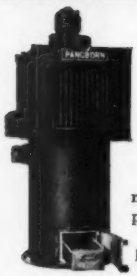
Ideal for maintenance and many other jobs, including removal of rust, dirt, scale, etc. Economically cleans large objects like tanks, bridges, structural work before painting. Six sizes, stationary or portable, from..... **$170.00** and up

Hydro-Finish SPEEDS POLISHING!

Removes scale, and directional grinding lines . . . prepares surfaces for plating and holds tolerances to .0001"! Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from **$1295.00** and up



STOP DUST at the SOURCE!



Pangborn industrial type Unit Dust Collectors trap dust at source. Machine wear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and material losses. Models from **$286.00** and up

COMPACT Blast Cabinet for SMALL WORK!

Ideal for producing smooth, clean surfaces on pieces up to 60" x 36" in size. Cleans metal parts, removes rust, scale, grime, dirt, paint, etc., in a few seconds. Saves money all year 'round. Models from **$315.00** up

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

Pangborn MAIL COUPON FOR DETAILS

Check for more information

- ☐ Blast Cleaning Cabinets
- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

PANGBORN CORP., 2100 Pangborn Blvd., Hagerstown, Md.

Gentlemen: Please send me more information on the equipment I've checked at the left.

Name.....

Company.....

Address.....

City.....Zone....State.....

SAFETY & PLANT PROTECTION

Respirator for Radioactive Dusts

The Comfo Ultra-Filter respirator protects workmen from radioactive dusts, oxides of beryllium, and similar hazardous air-borne particles. It has a filter efficiency of 99.99% against particles 3/10 micron in size.

The unit can be used effectively by plant protection and decontamination crews, as well as by regular plant personnel. Lightweight, close-fitting facepiece fits under most welding helmets. Complete details on the use of this respirator are in company bulletin CR-27.

Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8.

Turn the page

Cash in Your Scrap!

You help **the defense effort and your profit statement when you scrap and sell your broken tools.**

SAFETY & PLANT PROTECTION

Begins on page 186

Safety Valve for 50-Gal. Drums

The Ventadrum is a safety valve for 50-gal. metal drums. It can prevent dangerous explosions caused by pressure expansions. According to the Central Safety people, when you screw a Ventadrum into the bung opening of a drum you get these six features:

- Venting of the drum as the liquid contracts or is withdrawn.
- Slow escape of air when liquid expands under normal temperature change.
- Rapid release of pressure in the event of fire or quick temperature change.
- Automatic reseating of valve when pressure has been relieved.
- An integral screen that prevents fire from traveling into the drum.
- An automatic seal that closes if the container overturns.

Central Safety Equipment Co., 2201 E. Huntington St., Philadelphia 25.

■

Safety Clothes Made From Dynel

One of the new synthetic fibers, Dynel, has entered the field of safety clothing. The result, says the manufacturer, is a line of heavy-duty clothes that resist acids, caustics, moths, and mildew. The tough Dynel fibers are also said to be good insurance against wear, shrinkage, snagging, and tearing.

You can get shirts, trousers, and cover-alls in the MSA Chem-Klos line. Maker says they are easily cleaned and not harmed by even heavy concentrations of commercial dry-cleaning and washing solvents. The full story is in company bulletin CF-28.

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8.

Turn the page

In One Year

PANGBORN DUST CONTR

SAVES $15,000 for MIDDLESEX SILVER CO.

(division of R. Wallace & Sons Co.)

Heart of profitable dust control at Middlesex Silver is a Pangborn CJ Collector like this. Shown above in a cutaway view are the filters which make the CJ ideal for heavy loading applications like this.

Pangborn Dust Control recovers valuable silver from plant dust!

Talk about profit! Every year Pangborn Dust Control at Middlesex Silver earns a profit of $15,000 after *all operating expenses* are paid! Centrifugal collectors are used to trap coarse dust particles . . . and *high efficiency is assured* because valuable silver fines are recovered by the big Pangborn CJ cloth screen Collector. Result to Middlesex: Pangborn Dust Control has more than paid for itself since installed!

Pangborn has a complete line of Dust Collectors, each designed for a specific job. No matter if the dust in your plant is *valuable, hazardous, or just a nuisance* . . . chances are Pangborn Dust Control will *save you money*. Find out . . . there's no obligation. For full information, write today for Bulletin 909A to PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the Latest Developments in Dust Control and Blast Cleaning Equipment

DUST CONTROL

STOPS THE DUST HOG from stealing profits

MAGNOLIA

Die-Cast

EARING BRONZE BARS

A DEPENDABLE SOURCE OF SUPPLY—
Your Magnolia Distributor

Look to your Magnolia Distributor for a dependable localized source of service and supply for all your bronze bearing metal requirements. Backed by Magnolia's years of experience and research, your Magnolia Distributor can be a big help during these difficult days of shortages and high production requirements.

Write for your free copy of Magnolia's Size and Weight Charts.

REG. U.S. PAT. OFF.

839

SOLD THROUGH INDUSTRIAL DISTRIBUTORS EVERYWHERE

MAGNOLIA METAL COMPANY

21 West Jersey Street · Elizabeth, New Jersey

Begins on page 146

VALVES, PIPING & ACCESSORIES

Split-Flange Hose Coupling

Big feature of this split-flange clamp, says the maker, is that it is easy to use. You can put it on quickly with a small automotive-type wrench. An O-ring seal eliminates the need for tapered threads. And there's no wedging action to cause distortion of hydraulic apparatus.

You can use the clamp for high- or low-pressure service, or for suction return lines. It comes in a range of sizes for one- or two-wire braid hose from ½ to 2 inches ID. You can get them with either clamp or pressed-on couplings in straight or angle styles.

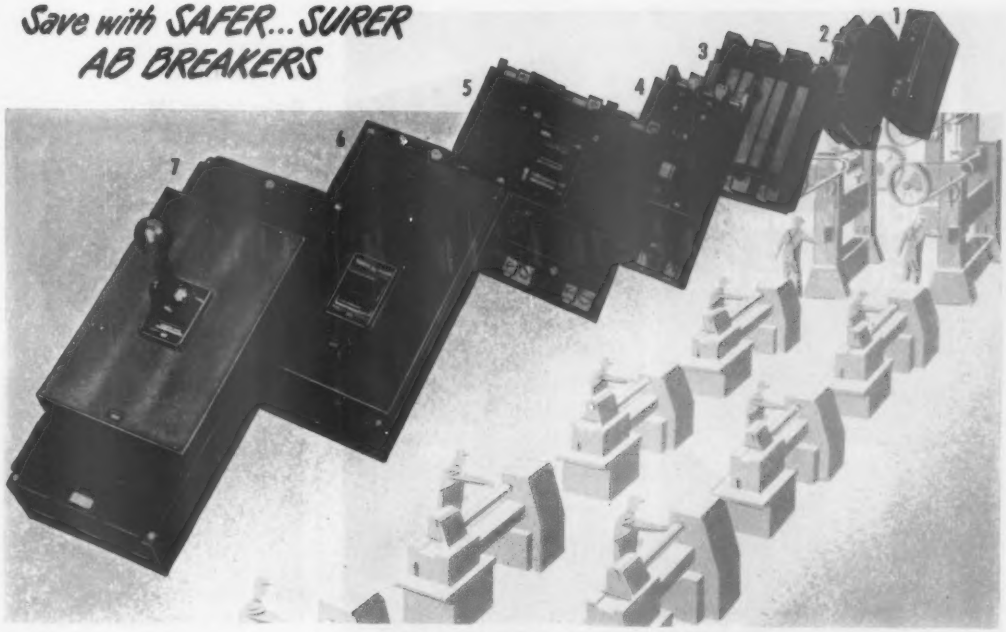
Anchor Coupling Co., Inc., Libertyville, Ill.

■

COMPRESSION PIPE COUPLING developed by Morris Coupling & Clamp Co., Ellwood City, Pa., is said to materially reduce electrolytic corrosion and turbulence at pipe joints. Coupling range from ½- to 14-in. standard pipe sizes. They'll couple ferrous to ferrous, or ferrous to non-ferrous materials; threaded to threaded, or threaded to non-threaded pipe.

Turn the page

Save with SAFER... SURER AB BREAKERS



A FULL LINE OF PROTECTION for full production lines

Power outages are doubly punishing when production lines are loaded. Today, lost production means longer deliveries; idle men and machines add to already fast rising costs.

Westinghouse Circuit Breakers help you minimize down time, and offer you completely reliable control and protection for every lighting and power requirement and for circuits that serve them. Westinghouse Breakers trip instantly on short circuits, yet ride out temporary, harmless peaks. And to get you off to a flying start again when trouble on the circuit is cleared, simply flip the breaker handle. No replacements, no chasing after fuses, no costly maintenance time in restoring power.

For assistance on any circuit protection problem, contact your nearest Westinghouse representative, or write for bulletin No. DB29-060, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-30047

THE AB CIRCUIT BREAKER LINE IS THE COMPLETE LINE—RANGE 5 TO 600 AMPERES

1. **P-1**—single pole; for applications where excessive vibration or shock is prevalent; 10-50 amperes.
2. **QUICKLAG®**—single pole; provides maximum protection for small-wire general lighting and branch circuits; 10-50 amperes.
3. **E FRAME**—1 to 3 pole; thermal trip type; for motors, lighting and other applications where time-delay is required; 5-70 amperes.
4. **F FRAME**—2 or 3 pole; thermal-magnetic trip type; 10-100 amperes.
5. **G FRAME**—2 or 3 pole; particularly adapted to severe operating conditions in heavy industry; 40-100 amperes.
6. **K FRAME**—2 or 3 pole; universal service power breaker; 70-225 amperes.
7. **L FRAME**—2 or 3 pole; primarily for main distribution feeders in central stations, industrial plants, commercial buildings; 125-600 amperes.

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

YOU CAN BE SURE... IF IT'S Westinghouse

AB CIRCUIT BREAKERS

THE COMPLETE LINE

HEAT...

WHERE *You Want It...*

WHEN *You Want It...*

VERTICAL DELIVERY TYPE
HORIZONTAL DELIVERY TYPE
CENTRIFUGAL FAN TYPE
For heating only, or with dampers, filters, etc., for every heating need

Efficiently, Economically with

AIRTHERM

Steam UNIT HEATERS

Efficient, dependable, economical heating performance . . . that's what you get with individually controlled Airtherm Steam Unit Heaters. The long life coils in Airtherm Unit Heaters have copper tubes and copper headers brazed into an integral heat transfer unit.

Regardless of whether your factory, shop or warehouse conditions require the horizontal, vertical or centrifugal fan type model, uniform heat is assured at a minimum of cost.

Write for Bulletin 1208B.

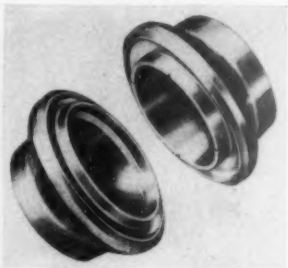
SEE OUR CATALOG IN SWEET'S

AIRTHERM MANUFACTURING COMPANY
751 South Spring Avenue
St. Louis 10, Missouri

For Heating Satisfaction . . . Think First of **AIRTHERM**

VALVES, PIPING, & ACCESORIES

Begins on page 188



Welding Coupling for Scale Free Piping

Tube-Turn SF can eliminate damaging welding scale from piping systems, claims the manufacturer. This welding coupling comes in two forged halves. When the two are brought together, the tongue of one slips into the groove of the other. A circumferential cavity directly beneath the beveled welding area prevents burn-through or the formation of icicles in the interior.

The hubs of each coupling half are also prepared for welding to pipe or fittings of corresponding size. You can get Tube-Turn SF couplings in 1¼- through 12-in. sizes in carbon steel, stainless, aluminum, and other metals.

Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.

■

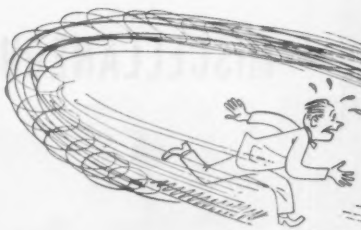
CLEAR PLASTIC FITTINGS made of Tenite No. 2 can save a little metal here and there in air feed and control lines. You can get 2-way or 3-way valves, tees, and crosses from Thor Hansen, 1398 Bryant St., Rahway, N. J. Valves have simple 2-piece design. They require no bolting, and can be cleaned in a jiffy by pulling out the valve stem.

Turn the page

Cash in Your Scrap!

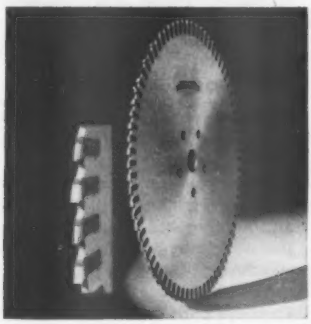
Electric motors that are "beyond repair" make a good source of salable scrap.

Why run around in circles— to find the Right Circular Saw?



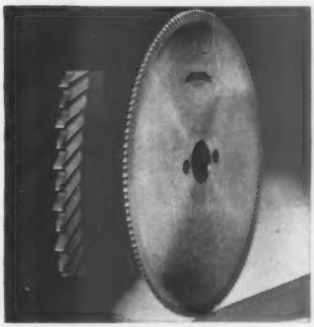
...when SIMONDS makes 'em all!

SIMONDS MAKES ALL THREE TYPES OF CIRCULAR METAL CUTTING SAWS. So you can be sure that SIMONDS will give you *the right saw for your job . . .* for any type of machine. See your Simonds Distributor *today.*



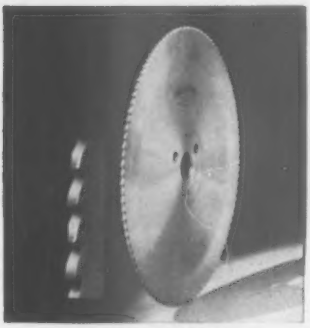
INSERTED TOOTH

For heavy production cutting, Simonds I. T. Saws are tops. Alternating square and beveled teeth "tri-vide" chips for easy cutting and clearance. An individual wedge securely anchors and aligns each tooth in the tough saw plate. What's more, this saw has maximum clearance for cool, free cutting . . . will stand an extremely high rate of feed . . . and teeth can easily be replaced singly or in complete sets right in your own plant by anyone of average mechanical ability.



SEGMENTAL

Where you require a finer tooth saw or especially smooth cuts on production work, *this is your saw.* Long-lived high-speed steel toothed segments are securely held in a tough alloy steel plate by a special tongue and groove design. Teeth are alternately square and beveled for easy cutting and clearance of "tri-vided" chips. Simonds special grinding provides ample clearance directly below the cutting points, insuring free, cool operation under all conditions. Sharpening can be done on any automatic grinder.



SOLID TOOTH

Clearance ground and furnished in High Speed, Si-Maloy (Patented), or Semi-High Speed Steel, Simonds Solid Tooth Saws are recommended for general shop cut-off requirements, for use on smaller automatic cut-off machines and for cutting operations where kerf is an important factor. Tooth design is determined by and especially suited for the application. Simonds' own steel, plus skilful heat treating and accurate grinding, insure long, dependable, trouble-free service.

SIMONDS
SAW AND STEEL CO.

Factory Branches in Boston, Chicago, San Francisco, and Portland, Ore. Canadian Factory in Montreal, Que.

OUT OUR WAY

First in value—
First in sales

SOL·SPEEDI·DRI

Accept no substitutes! Pound for pound, dollar for dollar, SOL-SPEEDI-DRI gives you *more for your money*, all factors considered. That's why it's America's sales leader in the oil and grease absorbent field. Selected raw materials, careful processing, and laboratory controls keep quality always uniform. Send the coupon today for generous free sample and descriptive literature about how to "dry clean" *your* floors with SOL-SPEEDI-DRI.

SPEEDI-DRI CORP., 210 W. Washington Sq., Philadelphia 5, Pa.

Warehouse stocks maintained in principal cities of the United States and Canada.

• • •

Inquiries in New York, New England, and New Jersey should write to Speedi-Dri Corp. Elsewhere in U.S. to Waverly Petroleum Products Co., 1734 Chestnut St., Phila. 3, Pa.

FREE SAMPLE: Fill out the coupon and mail today for big, free sample and brochure.

Name_____

Address_____

City_____ State_____

FMM 1-52

MISCELLANEOUS

Telephone Amplifier

Your telephone rings. You pick up the receiver and place the earpiece in an Addiphone. From that time on you can conduct a two-way conversation with the party on the other end of the line from just about any point in your room or office.

Addiphone is a device which amplifies both ends of a telephone conversation. You can speak into it and hear from it at appreciable distances from the telephone set.

Addiphone makes the telephone a more versatile instrument by permitting:

•Multi-party conferences at each end of the line. Everybody can get into the discussion without passing the receiver back and forth.

•Free hands to do other work. Once you insert the receiver in the Addiphone your hands are free to write, check files, etc.

Addiphone requires no installation, has no connection with the phone system. You just plug it into 110- or 220-volt line.

Exim Trading Corp., 11 Broadway, New York 4.

■

EMERGENCY SHOWERS are designed to produce the maximum wetting in the least time. Carefully located spray nozzles soak the entire body at once, says Logan Emergency Showers, Inc., P.O. Box 111, Glendale, Calif.

Turn the page

Engineers rate Modine the standard of excellence

COMPARE

ON EVERY COUNT MODINE UNIT HEATERS STAND OUT

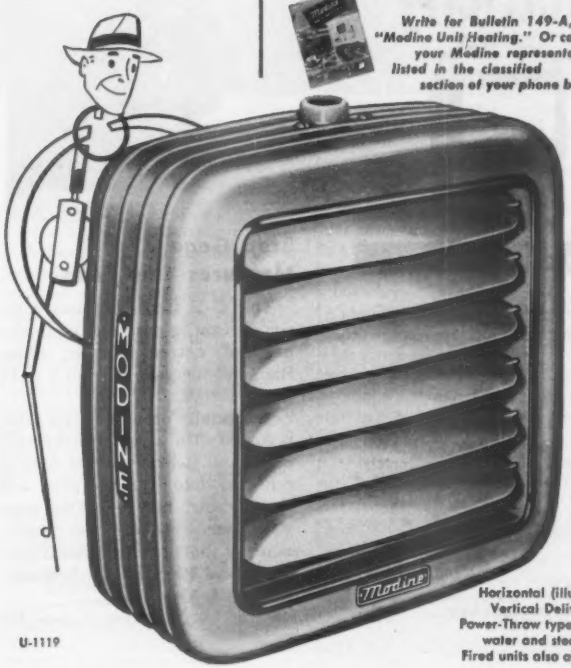
Compare performance! Modine's balanced combination of discharge air temperatures, velocity and volume give you perfect heating comfort.

Compare economy! Fuel bills are smaller with Modine because heat is delivered where it's needed — not wasted at the ceiling. And installation and maintenance costs are far lower, too.

Get all the facts from your Modine representative. *Compare first* — and you'll choose Modine. Modine Mfg. Co., 1505 DeKoven Ave., Racine, Wis.

Modine UNIT HEATERS

Write for Bulletin 149-A, "Modine Unit Heating." Or contact your Modine representative listed in the classified section of your phone book.



Horizontal (illustrated), Vertical Delivery and Power-Throw types for hot water and steam. Gas-Fired units also available.

U-1119

Discharge air temperatures of 110°-120° F. are correctly related to air velocities—assure perfect heating comfort plus lower fuel costs.

Sound-silencing features assure quieter operation—certified by accurate laboratory sound ratings. Especially important for commercial and institutional use.

Sturdy, steel, integral fan guard offers safety from exposed fan — serves as a resilient, vibration-absorbing mounting for the unit's motor.

... HEY CURLEY... YA DON'T HAVE TO THAW OUT THAT EXTINGUISHER... IT WON'T FREEZE!

You needn't worry about high or low temperature extremes with Ansul Dry Chemical Fire Extinguishers. All Ansul Extinguishers are tested and approved for –40°F operation. Special Low Temperature models are available for –65°F conditions. These same extinguishers can withstand prolonged exposure to temperatures up to 160° above zero. Think of the savings these features give you! No heated cabinets. No freezing of unprotected extinguishers left outdoors in winter weather. No accidental discharge due to exposure to high temperatures in a boiler room, etc. Still Ansul gives you the best fire protection money can buy.

SEE PAGE 220 Advt.

every man of electricity

needs the

Simpson

model 260

volt-ohm-milliammeter

OUTSELLS ALL OTHERS COMBINED

the Simpson model 260 volt-ohm-milliammeter has uses limited only by the skill and imagination of the operator—checks most anything where voltage is applied; continuity breaks, grounds... gives electrical readings on motors, magnetic chucks, elevators, relays—acts as wiring circuit tracer.

RANGES

20,000 Ohms per Volt DC, 1,000 Ohms per Volt AC

VOLTS: AC & DC: 2.5, 10, 50, 250, 1,000, 5,000

OUTPUT: 2.5, 10, 50, 250, 1,000

MILLIAMPERES, DC: 10, 100, 500

MICROAMPERES, DC: 100

AMPERES, DC: 10

DECIBELS: (5 ranges) –12 to +55 DB

OHMS: 0-2,000 (12 ohms center), 0-200,000 (1,200 ohms center), 0-20 megohms (120,000 ohms center).

PRICES: $38.95; Roll Top $46.90. Complete with test leads and operator's manual. 25,000 volt DC Probe available for use with 260, $9.95

SEE YOUR ELECTRICAL OR ELECTRONIC PARTS DISTRIBUTOR.

SIMPSON ELECTRIC COMPANY

5200 W. KINZIE STREET, CHICAGO 44, ILLINOIS • PHONE: COlumbus 1-1221

In canada: Bach-Simpson, Ltd., London, Ont.

MISCELLANEOUS EQUIPMENT

Begins on page 192

Hydraulic Stand

You can adapt this stand to the testing of valves, cylinders, flexible hose, and similar equipment. The Superdraulic provides test pressures up to 5000 psi. with standard pumps, and up to 30,000 psi. with special booster equipment.

Stands are built to order with pumps, relief valves, oil reservoirs, electric motors, flexible couplings, and incidental valving and piping to meet specific test purposes. You can use any type of hydraulic oil. And also modify the stands to include accumulator, cycling equipment, or timing devices.

Superdraulic Corp., 14256 Wyoming Ave., Detroit 4.

■

Step Gage Measures Thin Films

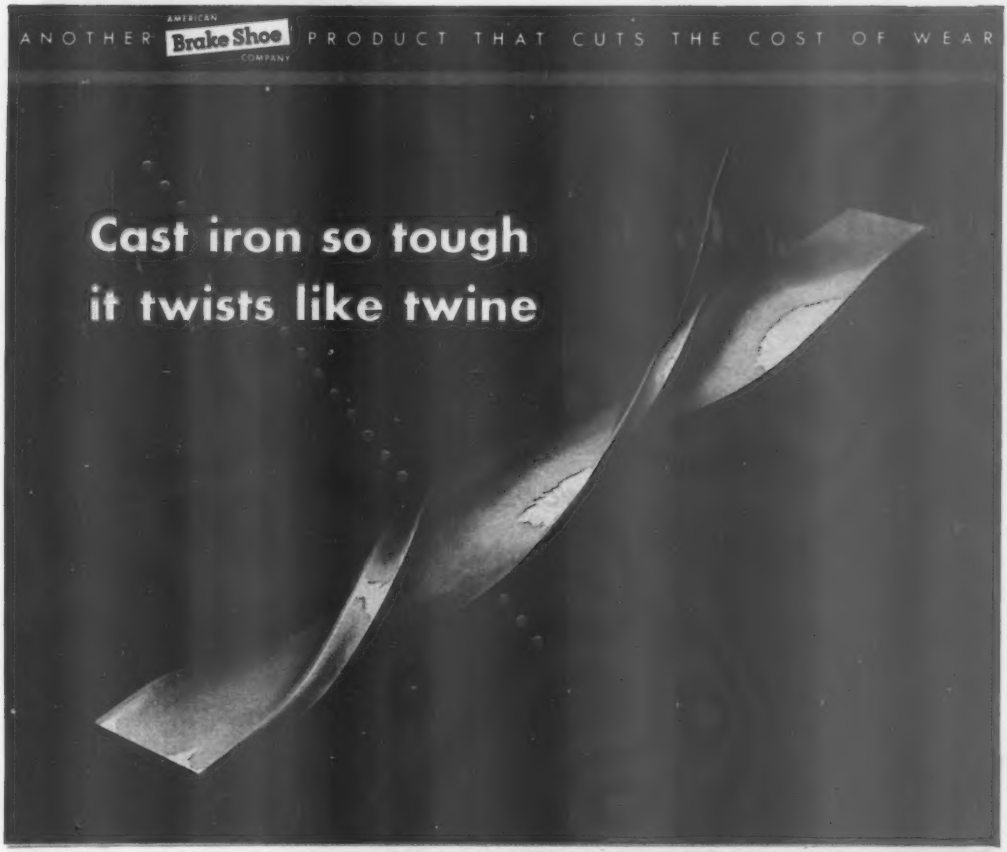
This G-E step gage uses color comparison to measure the thickness of extremely thin films. Range of the gage is from 2 to 16 micro-inches.

A specially prepared glass plate is coated with varying thicknesses of barium stearate. White light is reflected onto both the gage and the unknown film to find the gage strip whose color most nearly matches that of the unknown film.

General Electric Co., Schenectady 5, N. Y.

Turn to page 363

ANOTHER AMERICAN Brake Shoe COMPANY PRODUCT THAT CUTS THE COST OF WEAR



Ductile Iron—A New Metal . . . Offers New Possibilities To Industry!

Unlike many irons, you can bend it, twist it, hit it or heat it and it stands up. Ductile iron is tough. It is stronger than mild steel. This remarkable metal possesses the desirable qualities of cast iron together with many of the advantages of steel. It frequently replaces steel in applications, such as gears, crankshafts, pressure castings, dies and pipe at a lower cost.

Ductile iron may be cast in large or small castings in intricate shapes that are difficult or impossible to cast in steel. It can be cast with a fine surface and to close tolerances. It can have the unique property of combining a chilled surface with a tough ductile core which gives it excellent abrasion resistance and considerable shock resistance. It can be welded to iron, or steel in a strong, tough bond. It has good machinability.

The potential uses of ductile iron are nearly endless because it combines a wide range of properties with a competitive cost. Our engineers will be glad to work with you in finding how ductile iron may be applied to your problem. Write Department C, American Brake Shoe Co., 230 Park Avenue, New York 17, N. Y. for literature on ductile iron.

AMERICAN Brake Shoe COMPANY
230 PARK AVE., NEW YORK 17, N.Y.

10 Divisions of American Brake Shoe Co. produce wear-resisting parts in 55 American and Canadian plants.
AMERICAN BRAKEBLOK DIVISION • AMERICAN FORGE DIVISION • AMERICAN MANGANESE STEEL DIVISION
BRAKE SHOE AND CASTINGS DIVISION • ELECTRO-ALLOYS DIVISION • ENGINEERED CASTINGS DIVISION
KELLOGG DIVISION • NATIONAL BEARING DIVISION • RAMAPO AJAX DIVISION • SOUTHERN WHEEL DIVISION

Copyright 1951, American Brake Shoe Company

Life-Linestarter
PAIRED FOR PRODUCTION
Life-Line motor
ON
TRIPPED
OFF
RESET
OPEN COVER
WESTINGHOUSE
DO NOT LUBRICATE

FREE maintenance men for other important jobs with these two

Why nurse motors and controls? This pair stands on its own feet . . . takes the increased production rate without "babying". For example: Life-Line motors need no lubrication . . . free men for other maintenance duties. Just install Life-Line and forget them. Life-Linestarters® cut maintenance, too. You can take one apart with a screw driver—in two minutes. One single moving element. No sliding members . . . nothing to stick or jam. These features pay off. Take the case of an eastern plant, for example:

They installed ten new punch presses. Shortly, motor overheating and burnouts resulted. A check revealed lack of lubrication as the trouble. Motors installed fourteen feet above floor level were "forgotten".

Life-Lines have replaced these troublemakers. Result? No more outages. Motors are still forgotten—but safely. They *need no lubrication.*

How about the starters? Many times vibration or a sudden shock from the press caused ordinary starters with gravity-type operation to open. This stopped production. But with the Life-Linestarter, faulty operation is a thing of the past. The inverted, clapper-type design will not open from shock or vibration.

Here is but one example from many where Life-Line motors and Life-Linestarters paid off on the production line . . . freed maintenance people for other duties.

Why not take advantage of this Life-Line production team? It costs no more. A check with your Westinghouse representative will give you the complete facts on each. Ask him for copies of "Life-Line Motor Book", B-3842 and "Tomorrow's Starter Today", B-4677. He has copies for you. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-21628

YOU CAN BE SURE... IF IT'S Westinghouse

Life-Line

MOTORS and CONTROLS

Send for this

FREE BOOK TODAY!

Window glazing—desk tops, splash guards—dust covers, if you have a job in protective maintenance . . . try plastics! Send for this informative book today—it suggests 157 ways plastics can save you more in time and money on hundreds of maintenance jobs!

Cadillac Plastic Co.

15111 Second Blvd. • Detroit 3, Michigan
Townsend 9-9500

MAIL COUPON

Cadillac Plastic Co. Detroit 3, Michigan

Gentlemen: Please send me without obligation your book entitled "157 ways to use plastics for maintenance"

Name_____

Firm Name_____ Title_____

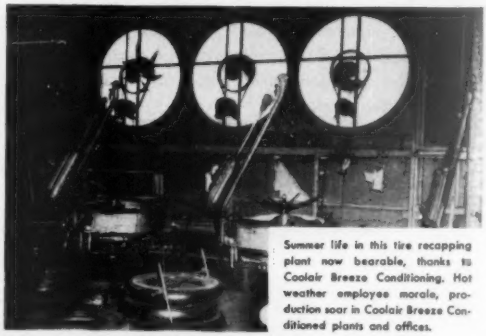
Address_____

City_____ Zone____ State_____

HERE'S THE LOW-COST WAY TO COOL PLANTS & OFFICES!

It's the breeze that cools you and your car after you've been parked in the hot summer sun. With Coolair Breeze Conditioning Fans you can introduce cooling, healthful breezes into plants and offices at low cost, without major installation expense and at a minimum outlay for operation and upkeep. No water required! Result—more comfort, better summertime production.

Coolair Breeze Conditioning can solve your cooling problem! The Coolair line ranges from window fans up to 9′ industrial giants. Remember, it takes a real breeze to keep you cool. And your Coolair representative will be glad to plan the installation with the capacity to provide you with cooling breezes all summer long.



Summer life in this tire recapping plant now bearable, thanks to Coolair Breeze Conditioning. Hot weather employee morale, production soar in Coolair Breeze Conditioned plants and offices.

Low-Cost Cooling? **You'll be surprised how little Coolair Breeze Conditioning costs! Write TODAY for complete information and the name of your local Coolair representative. American Coolair Corporation, Jacksonville 3, Florida.**

The complete line of Coolair Breeze Conditioning Fans includes mouse-quiet, spring-mounted models for cooling homes, offices, schools, churches, etc.

need help on **steel strapping** methods?

IT'S no coincidence that Donald Dougherty, Brainard Strapping System representative in Philadelphia, is showing this customer the proper use of a heavy-duty strapping tool.

Brainard's catalog lists over 1,000 items of steel strapping, tools, and accessories. It's the job of Don and his fellow Brainard representatives to see that the right equipment is applied to your operations.

And if you have an extra-tough problem, your Brainard man will bring factory engineers into your plant—pronto. They'll study your packaging, shipping, or handling methods . . . make recommendations . . . work out the specifications for you.

You'll get this superior service from Brainard representatives located throughout the U. S.; in Canada, P. J. McArthur Co., Toronto.

Write for NEW CATALOG!

COMPLETE STRAPPING SERVICE • LIGHT AND HEAVY DUTY STRAPPING • TOOLS AND ACCESSORIES

Brainard

SHARONSTEEL

STEEL COMPANY

BRAINARD STEEL COMPANY, Dept. I-1
Griswold Street
Warren, Ohio

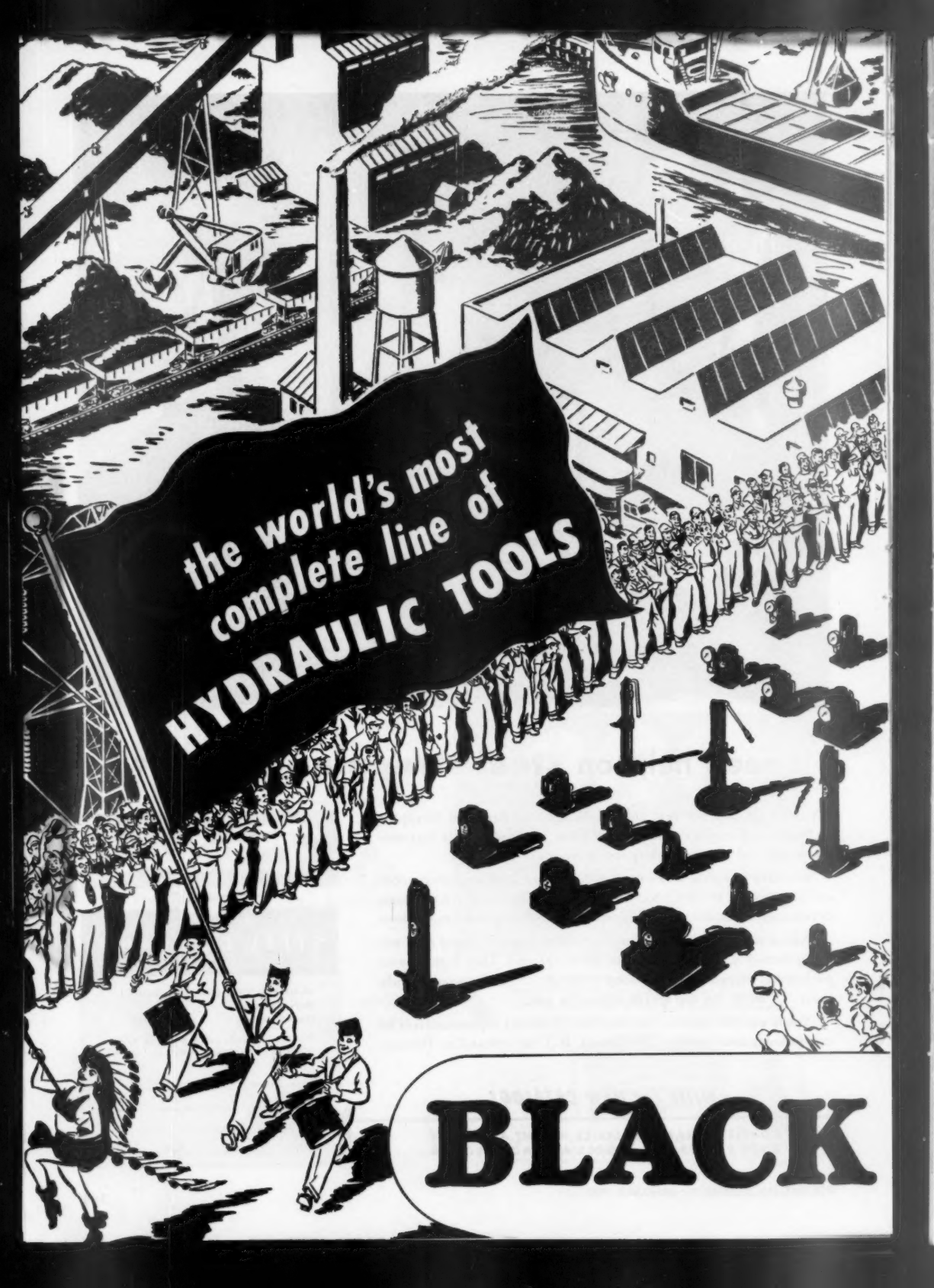
Please send new catalog listing specifications of strapping, tools, and accessories.

Your Name_____

Company_____

Address_____

City_____ State_____


the world's most
complete line of
HYDRAULIC TOOLS
BLACK

Join the march to efficient production and maintenance!

Your efficiency just naturally goes up when you put the advantages of this remarkable line of Portable Hydraulic Equipment to work for you. You'll find you can complete a vast number of jobs faster, easier — and make better use of your manpower. That's why — with today's growing mobilization demand — more and more schedule-conscious plant men agree: *"Don't do it the hard way, do it the hydraulic way."* Sold by leading distributors. Write for catalogs. Blackhawk Mfg. Co., Dept. J-2712, Milwaukee 1, Wis.

Hydraulic Hand Jacks — up to 100 tons ● Gauge-Equipped Jacks
Wheeled Service Jacks ● "Porto-Power" Remote-Controlled Jacks
Hydraulic Pumps, Rams, Valves, Fixtures, Ram Attachments, Gauges
"Porto-Power" Maintenance and Electricians' Assortments

HYDRAULIC TOOL HEADQUARTERS

HAWK®

SIGNIFICANT DEVELOPMENTS IN PRACTICAL LABOR RELATIONS

TOLD IN BRIEF FOR BUSY FACTORY EXECUTIVES

By **PAUL A. KING**, *Bigelow-Sanford Carpet Company, Inc.*
Member, New York Bar.

WHAT ABOUT TAX PENALTIES IF YOU COVER UP FOR FIRED WORKERS? *If you write down "resigned" on the records of an employee who actually was fired, it does not affect your unemployment insurance merit rating* ..... **page 202**

CAN UNION PREVENT RETIREMENT UNDER OLD PENSION PLAN? *Yes or No, depending on whether or not your old pension plan has been accepted as an "established plant custom and practice."* **page 202**

WHAT'S DISCRIMINATION AGAINST VETERANS? *If a contract clause applies to all employees, veterans or not, chances are you're not discriminating, says U.S. Circuit Court* ..... **page 204**

LONG SERVICE AWARDS BECOME BARGAINABLE. *Looks like you may have to bargain over the traditional gold watch—or whatever you give for long service* ..... **page 206**

EMPLOYEE RENT INCREASES SUBJECT TO BARGAINING. *May hit you if you're providing living quarters for employees* **page 206**

IT'S RISKY TO BARGAIN WITH "SECEDERS." *You can do it, but it's a tricky job to bargain with a group that secedes from a recognized union* ..... **page 208**

GUIDE FOR "PROFANITY FIRINGS." *Whether a discharge will stick in arbitration may depend on whether or not the "cusser" was kidding* ..... **page 210**

INTERIM WSB HEALTH AND WELFARE PLAN RULE. *This may tide you over until complete regulations are out* ..... **page 210**

CAUGHT WITH BELOW PAR WAGE-LEVELS? *A recent WSB regulation will permit you to hike wages to prevailing levels* **page 212**

BRIEF — BUT IMPORTANT. *Next year it may take longer to process an unfair labor practice case . . . Engineers are scheduled for special treatment under salary freezing . . . A fine point in jurisdiction has been settled by the NLRB . . . Don't cut working hours of employees without corresponding pay cut* ..... **page 212**

What About Penalties If You Cover Up for Fired Workers?

As a sympathetic employer you may write "resigned" on the record of an employee who actually was fired for offenses like drinking, petty thievery, or altering a time card.

Then you begin to worry about its adverse effect upon your merit rating for unemployment insurance tax purposes. Will your kindness cost you money?

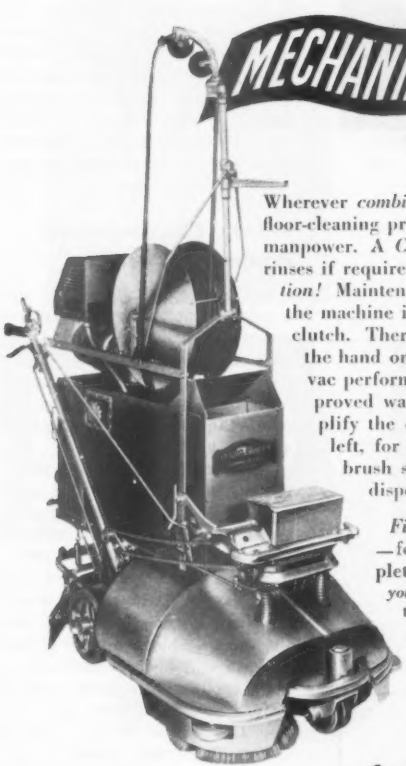
Here's some guidance: In those states that have faced the problem, what counts is the *real* reason the employee lost his job—not the reason you set down on the record. So you probably don't have to worry about losing money by being kind in Mississippi, Missouri, North Carolina, Oklahoma, Pennsylvania, and Wisconsin. These states have already ruled on this kind of situation. And the odds are good that other states will eventually rule similarly.

Can Union Prevent Retirement Under Old Pension Plan?

Say you've had a pension plan for years. You put it in without consulting the union—unilaterally, as the labor experts would say. Then you try to retire old Joe Jones under the plan, Joe being only the most recent of many employees you've retired.

But this time the union squawks. It says you can't retire

Let's not clean away dollars and man-hours with costly, inadequate floor care



MECHANIZE your floor-cleaning with a COMBINATION SCRUBBER-VAC!

Wherever *combination-machine-scrubbing* is the practical solution to the floor-cleaning problem, any lesser, slower method is wasteful of money and manpower. A *Combination Scrubber-Vac* applies the cleanser, scrubs, rinses if required, and picks up (damp-dries the floor) — *all in one operation!* Maintenance men like the *four-in-one feature* . . . also the fact that the machine is simple to operate. It's *self-propelled*, and has a *positive* clutch. There are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs efficiently and quietly. Cable reel is self-winding. Improved waterproof wiring and minimum electrical connections simplify the cleaning of the machine. *Model 213P Scrubber-Vac* at left, for heavy duty scrubbing of large-area floors, has a 26-inch brush spread, and cleans up to 8,750 sq. ft. per hour! (Powder dispenser is optional.)

Finnell makes *Scrubber-Vac Machines* in a full range of sizes — for small, vast, and intermediate operations. From this complete line, you can choose the size that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that you can lease or purchase a *Scrubber-Vac*, and that *there's a Finnell man nearby* to help train your maintenance operators in the proper use of the machine . . . to recommend cleaning schedules for most effectual care . . . and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2501 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

Conserve Manpower with Completely Mechanized Scrubbing

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

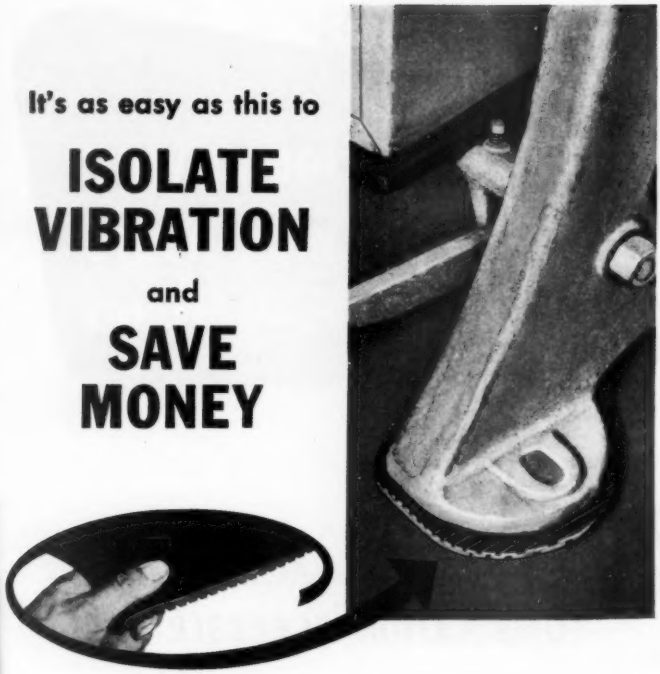
BRANCHES IN ALL PRINCIPAL CITIES

It's as easy as this to

ISOLATE VIBRATION

and

SAVE MONEY



. . . with ISOMODE* PADS

Here's the durable mounting to absorb shock . . . reduce noise . . . cut your maintenance costs. In hundreds of installations, the Isomode Pad has proved to be not only one of the most economical mounts, but also one which does a superior job of isolating vibration.

This 5/16" thick, ribbed, resilient mounting works under legs or base of most equipment—even under large capacity punch presses! By absorbing the forces normally transmitted to floor, Isomode Pads reduce building damage and undue deterioration of machinery. With no bolting in most cases, it costs you less to install machines — to relocate them. And you get a quieter plant, besides.

Made of long-lasting DuPont Neoprene that resists oil, water, aging. Write for details — discover their surprisingly low cost.

**Trade Mark Reg. U.S. Pat. Off.*

THE MB MANUFACTURING COMPANY, INC.
1080 State Street, New Haven 11, Conn.

Please send data sheet containing more information on Isomode Pads and how to install them easily and quickly.

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

PRACTICAL LABOR RELATIONS

Begins on page 202

Joe because the labor agreement doesn't talk about age as a requirement for employment.

That's just what happened to the John Morrell Company. Arbitrator Harold M. Gilden reminded the United Packinghouse Workers (CIO), who used this argument, that the company had been retiring employees since 1941, when the plan was put into effect. He also reminded the union it had negotiated many labor agreements with the company since then, and in all that time nary an objection was raised. The union's failure to raise hob in all those years amounted to an acceptance of the plan as an established plant custom and practice.

What's Discrimination Against Veterans?

It's pretty clear by now that a veteran can't kick if, under his union contract, he is treated just like any other employee. If the rule happens to work out badly for him, that's charged to his misfortune. But cases of this kind are still going to court.

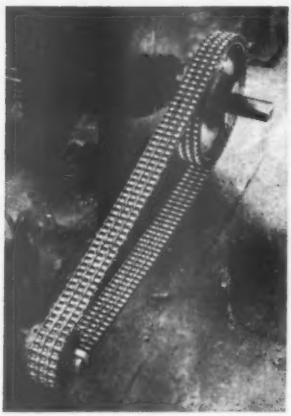
The latest in the long string of decisions confirming this principle deals with vacation pay to three employees who returned from military service in 1946.

The contract clause said that 1946 vacation allowances would be based on 1945 earnings. But the three employees were at war in 1945 and had no earnings — even though they were back in 1946. So no vacation pay was due them, said a U.S. Circuit Court. The court found no discrimination against veterans in the case. All employees—including those on leave of absence in 1945—were treated alike. (*Foster vs. General Motors*)

Turn the page

There Is No Substitute For Quality–In...

...Roller Chains



● Back of every link, every foot of Diamond Roller Chain are more than 60 years of experience in the production of this one type of product. Add to this the cumulative results of metallurgical and engineering research, special facilities and skilled craftsmanship and you have a smooth, flexible steel roller bearing type power transmission of uniform quality . . . quality, for which there is no substitute.

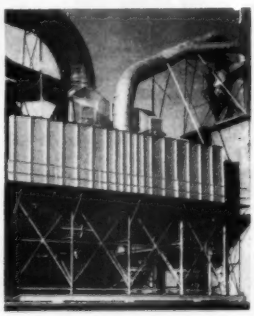
DIAMOND CHAIN COMPANY, Inc.
Dept. 449, 402 Kentucky Avenue, Indianapolis 7, Indiana
Offices and Distributors in All Principal Cities
Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

Dust is a serious threat to top-efficiency operation of your plant—but DRACCO DUST CONTROL EQUIPMENT can supply the positive, sure protection you need.

Modern, well-run industrial plants don't compromise with dust because they can't afford to. Compromising with dust means gambling with explosive dusts, exposing workmen to hazardous or toxic dusts, losing valuable materials, or ignoring higher operating costs and lower production directly resulting from uncontrolled dust.

DRACCO has the answers to industrial dust problems and has helped innumerable companies stop this threat to their efficiency and profits. DRACCO DUST CONTROL EQUIPMENT has found wide acceptance in industry because it incorporates proven designs, custom-engineering to specific requirements, and accurate fabrication—all based on DRACCO'S 35 years of experience.



If uncontrolled dust is endangering your plant efficiency, why not call in DRACCO engineers for a specific recommendation on solving your problem?

DRACCO CORPORATION
4075 E. 116th St., Cleveland 5, Ohio
415 Lexington Avenue, New York 17, N. Y.

AGENTS IN PRINCIPAL CITIES

DRACCO *Performance Proved*
DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

PRACTICAL LABOR RELATIONS

Begins on page 202

Long Service Awards Become Bargainable

It may not be long now before you may see employer and union hotly arguing over what to give loyal employees for their long services. Shall it be a diamond ring—or perhaps a share of company stock—instead of the traditional gold watch? This is not far-fetched.

The NLRB has just set the stage for a bargaining session of this kind by telling the United Shoe Machinery Corporation, Jaffrey, N. H., that its grant of company stock to members of that company's 25-year service club comes within the definition of wages. And since it does, says the NLRB, it is an appropriate subject of bargaining. The company had the "mistaken" view that the stock was a gift—and not part of its employees' regular compensation.

The company had another mistaken idea, it develops. It thought an employee who goes out on strike suffers a break in service and would have to begin to accumulate credit for 25-year service club membership all over again upon his return to employment. Not so, said the NLRB. This would be discrimination against strikers.

Employee Rent Increases Subject to Bargaining

If you rent homes or other living quarters to your employees, you stand an excellent chance of having to bargain with the union if you want to raise the rent. The NLRB has ordered the Talladega, Ala., plant of the Bemis Brothers Bag Co. to negotiate the subject with the United Textile Workers Union (AFL). It rules

GOULD

Plus-Performance Plan

. . . HELPS EXTEND YOUR BATTERY POWER BY HELPING YOU TO

KNOW THE CONDITION OF YOUR BATTERIES!

Knowledge of the condition of your batteries is important because: (1) you know when batteries should be replaced to assure you of uninterrupted power, (2) you know whether your batteries are being overworked and (3) you can be sure of correct charging and systematic maintenance. For these reasons, the GOULD PLUS-PERFORMANCE PLAN emphasizes the various ways to determine battery condition.

The GOULD PLUS-PERFORMANCE PLAN consists of manuals, articles, specifications, bulletins, record cards, charts and graphs covering every phase of battery care. It gives you information on how to select charge, handle, maintain, inspect and test that can improve your battery performance as much as 50%! It's FREE. Write for booklet describing the plan.

Temperature and specific gravity readings indicate battery condition.

DETERMINING INDUSTRIAL TRUCK BATTERY CONDITION

RECORDS—Specific gravity, time and temperature readings of pilot cells before and after charging should be taken daily and compared with previous readings.

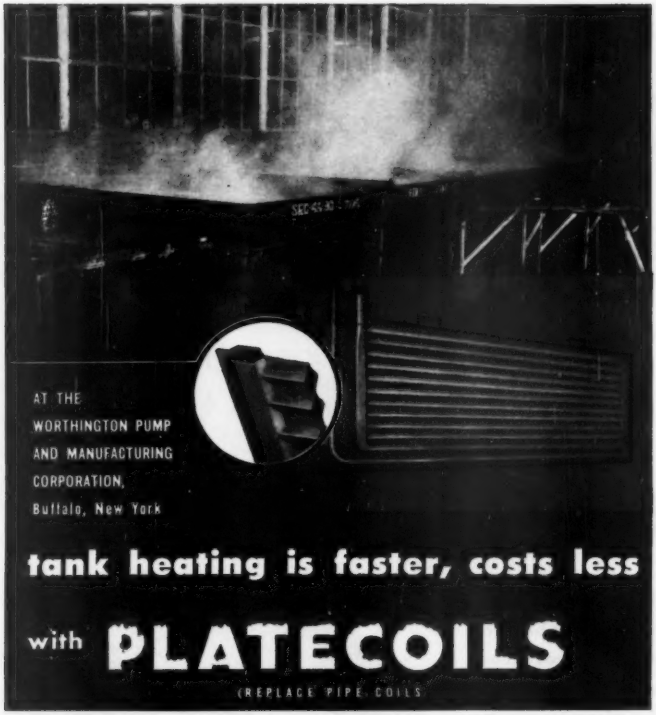
TEST DISCHARGE—To determine whether a battery is delivering rated capacity, make a test discharge. Discharge a fully charged battery at 6-hour rate until the voltage drops to 1.75 volts per cell. Compare ampere hour capacity obtained with rated capacity. Batteries delivering less than 80% of rated capacity, with all cells uniform, should be considered for replacement.

Gould "Thirty" with "Z" Plates—America's Finest Industrial Truck Battery

GOULD STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries



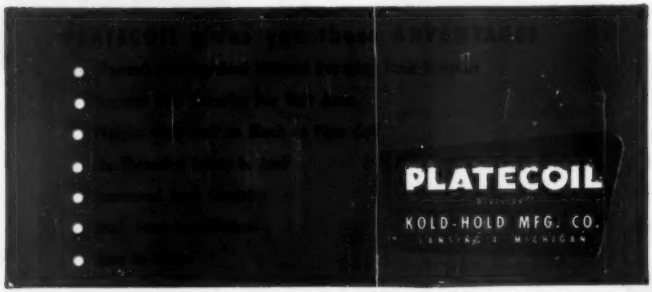
Worthington Pump and Manufacturing Corporation has found that it costs less to buy and use Platecoils in their Parkerizing tanks than it does to make their own steel pipe coils. When the steel pipe coils were used, they had to be replaced on the average of every 3 months. The Platecoils have been in use over a year, and there have been no repairs or expenses other than the original installation cost.

Platecoils heat the tanks faster because they have greater prime surface in any given area. A 22" x 47" Platecoil gives the same heat transfer surface as 32 ft. of 1½" pipe. This not only means quick starts in heating tank solutions but also greater tank capacity for work.

"quick change hangers" make installation easy

By the use of "quick change hangers," Platecoil installations can be made in open tanks in a half hour or less by one man and a helper. There is no welding or pipe cutting . . . two connections to make and the installation is complete. Should repairs become necessary, Platecoils can be removed and replaced in a matter of minutes without emptying the tank. Replacement is made from outside the tank.

Let us show you how you can conserve steel and save time, money and manpower by using Platecoils for tank heating or cooling. Write today for bulletin No. P60.



PRACTICAL LABOR RELATIONS

Begins on page 202

that "employer-provided living accommodations are encompassed within the terms 'wages' and 'conditions of employment' where such accommodations are an integral part of the employment relation."

In the Bemis case the lease provided that the rent could be deducted from wages owed the employees and that occupancy was based upon continued employment. But your leases need not go as far as the Bemis lease went to make your rentals subject to bargaining. If you rent to workers, check these two cases: *Elgin Standard Brick Mfg. Co., 26 LRRM 1343;* and *Hart Cotton Mills, Inc., 26 LRRM 1566.*

It's Risky to Bargain With "Seceders"

The Taft-Hartley Act says you must "bargain collectively" with the representative of your employees about wages, hours, and conditions of employment. So once a union has been designated as the representative of your workers and you know about it, you bargain with any other group at your own risk.

It won't help you a bit if you show that you bargained with the other group because it indicated clearly that it was unhappy with the union.

You *can* bargain with this other group, however, if you're careful. Make sure that the group has *withdrawn* the union's authority to represent it *before* it approached you — not after. And the withdrawal must be "by clear and unambiguous conduct and with the degree of certainty required to establish the original designation." (*Reeder Motor Co., NLRB*)

Turn the page

LARGE *Meat Packing Company*

SOLVES DIFFICULT CLEAN-UP PROBLEM

● You can't clean equipment with hose that makes marks! A large midwestern meat packer satisfied himself on this score by attempting to use ordinary makes of washdown hose for cleaning stainless steel processing equipment.

The hose just didn't work! Everything it brushed against got branded with dirty black smudges. Hose covers wore off prematurely on hard cement floors. Action of scalding water caused hose tubes to swell and break loose from the carcass. This tremendously reduced hose efficiency and caused dangerous blowouts.

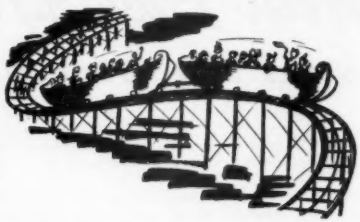
The problem was turned over to Republic's local distributor, who recommended use of Republic Creamery Hose . . . a lightweight, flexible carrier, built with grease and abrasion-resisting white covers that never leave stains.

Since then there's been no sign of trouble, and after a long period of continuous service the Republic Hose remains in top working condition.

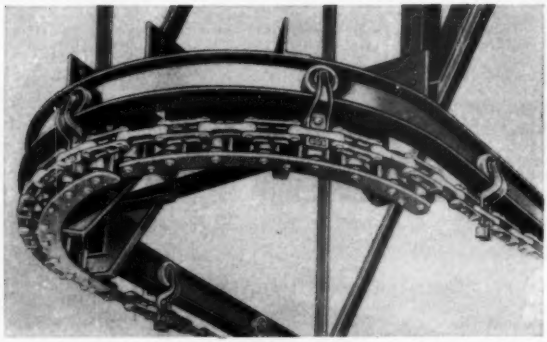
Republic Creamery Hose is just one of the complete line of Republic's Industrial Rubber Products designed to give you better performance at reduced costs. Write us direct or contact your local Republic Distributor for a free analysis of your job requirements.

The FIRST Roller Coaster

Originally known as the Switchback, the first Roller Coaster was built in Paris in 1816. The crude originals were soon discontinued because of numerous fatalities. However, in 1880 they were again introduced in Paris and the United States simultaneously —and have since been enjoyed by millions.



JERVIS B. WEBB COMPANY was the FIRST to develop Horizontal Roller Curve Assemblies



Typical Webb Horizontal Roller Curve Assembly

The Webb Roller Curve is the most economical, serviceable and satisfactory unit for carrying an overhead conveyor chain around a horizontal curve. Chain and trolleys are held in the correct vertical position by ball bearing rollers which reduce both friction and wear to a minimum. Roller Curves are made in various radii and arcs for varying needs. Rollers are mounted between two segment bars.

The Working Part Of A Roller Curve Is The Roller

Rollers used in Webb Roller Curves are specially designed and built for the service. Available for two types of lubrication . . . oil hole in cover and grease fitting in drilled center pin. In either case, the Roller Curve is assembled so as to make lubrication easy. The design of the Roller Curve is such that the rollers are readily replaceable without dismantling.

CONVEYOR ENGINEERS AND MANUFACTURERS

JERVIS B. WEBB COMPANY

8939 ALPINE AVE. DETROIT 4, MICH.

OFFICES IN PRINCIPAL CITIES

FACTORIES IN DETROIT . . . LOS ANGELES . . . HAMILTON, ONT.

PRACTICAL LABOR RELATIONS

Begins on page 202

Guide for "Profanity Firings"

Unions fear management's prerogative to discipline employees who use filthy or profane language. They worry about "mistakes" — that an otherwise good employee may be fired for using such language in a "kidding" way. As a result, the tendency is to play safe, and object to any discharge based on the use of abusive language.

An arbitrator, however, upholds management's right to fire an employee when the language is used in an insulting way. But not if the language was used in friendly fashion. Industry would lose too many workers if the latter were the case. If you've ever been cussed out by an employee, you'll appreciate the distinction made by the arbitrator. (*Cities Service Oil*)

Interim WSB Health and Welfare Plan Rule

The Wage Stabilization Board is still working on its final regulations covering health and welfare plans. But it has come up with an "interim" policy that may give you some relief right now. A 3-man WSB subcommittee will approve health and welfare plans without too much delay in these cases:

- If you want to extend an existing plan to other geographical divisions of your company.
- If you want to extend an existing plan to additional smaller groups of employees.
- If you want to improve an existing plan in a "small" way—changing benefit levels only slightly. (What's "small" is up to the board, of course.)

Turn the page

. . . turning wings into fuel tanks

With the increased operational range of the modern airplane, up to *three tank cars* of fuel may have to be carried. Such capacity involves a real problem in design. One answer is the "integral wing tank" where large sections of the wing become integral fuel tanks. Working closely with aircraft engineers, 3M developed a sealer that closes the cracks and crevices, tightly sealing the fuel space.

Consider the requirements such a sealer must meet. It must adhere perfectly to the metal under severe service conditions. It must resist rapid and extreme changes in both pressure and temperature. It cannot crack or lose adhesion with wing flex nor can gas or oil change its properties.

3M integral fuel tank sealers are only one specialized type of adhesive . . . and the development of many such compounds for all industry is a specialty of 3M.

See what adhesives can do for you . . .

WRITE FOR 3M'S 32-PAGE BOOKLET ON ADHESIVES, COATINGS AND SEALERS. IT'S FILLED WITH INTERESTING INFORMATION AND EXAMPLES OF SUCCESSFUL APPLICATIONS IN ALL INDUSTRIES. ADDRESS YOUR REQUEST TO 3M, DEPT. 31, 411 PIQUETTE AVE., DETROIT 2.

3M COMPANY

OVER 1,000 BASIC

ADHESIVES · COATINGS · SEALERS

ADHESIVES AND COATINGS DIVISION · **MINNESOTA MINING AND MANUFACTURING COMPANY**

411 PIQUETTE AVE., DETROIT 2, MICH.

GENERAL OFFICES: ST. PAUL 6, MINN.
EXPORT AND CANADIAN SALES: 270 PARK AVE., NEW YORK 17, N. Y.

NO INSTRUCTIONS NECESSARY WITH THIS EXTINGUISHER!

IT'S A RANDOLPH!

From bracket to blaze in split seconds! No valves to turn, no nozzles to adjust; just point and press your thumb and Randolph's cloud of snowy CO_2 kills fire completely!

Non-damaging Randolph CO_2 evaporates without a trace, is non-toxic, won't conduct electricity, deteriorate or freeze. And *all* Randolph Models are Underwriters' Approved.

A complete line of extinguishers and automatic systems

Learn how Randolph gives your plant panic-proof, positive fire protection! Write Randolph Laboratories, Inc., 4 E. Kinzie St., Chicago 11, Illinois.

RANDOLPH SIMPLIFIED FIRE EQUIPMENT

PRACTICAL LABOR RELATIONS

Begins on page 202

Caught With Below-Par Wage-Levels?

Have you been losing employees because the wage-freeze caught you with wage levels *far* below those prevailing in your industry or area?

A recent Wage Stabilization Board Regulation will permit you to hike wages to prevailing levels. Ask your Wage-Hour Division for Form 100 to be used in securing the necessary approval.

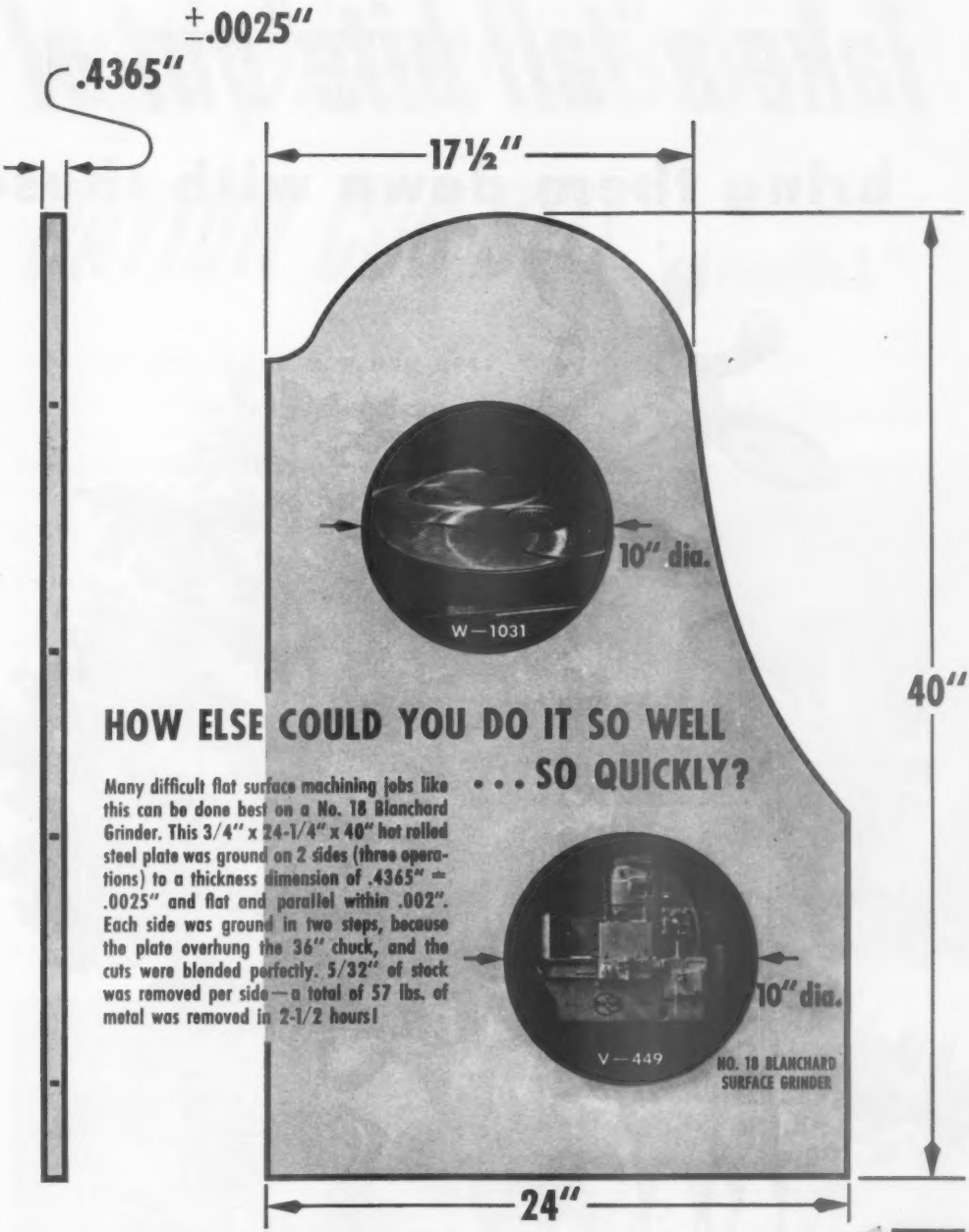
BRIEF BUT IMPORTANT

► **Next year it may take longer to process an unfair labor practice case** before the NLRB—perhaps as much as 18 months. Budget cut for 1952 is the reason—100 employees are to go.

► **Engineers are scheduled for special treatment under salary freezing.** While they won't be exempt from the program, the Salary Stabilization Board is preparing a regulation designed to furnish adjustments to correct hardships and inequities.

► **A fine point in jurisdiction has been settled by the NLRB.** Ruled that English language announcers could not set up a unit independent of foreign-language announcers of a radio station. (*Emil Denemark, Inc.*)

► **Cut working hours of employees without a corresponding cut in pay** and you'll be guilty of violating the Wage Stabilization law, warns the Wage Stabilization Board.



HOW ELSE COULD YOU DO IT SO WELL . . . SO QUICKLY?

Many difficult flat surface machining jobs like this can be done best on a No. 18 Blanchard Grinder. This 3/4" x 24-1/4" x 40" hot rolled steel plate was ground on 2 sides (three operations) to a thickness dimension of .4365" ± .0025" and flat and parallel within .002". Each side was ground in two steps, because the plate overhung the 36" chuck, and the cuts were blended perfectly. 5/32" of stock was removed per side—a total of 57 lbs. of metal was removed in 2-1/2 hours!

NO. 18 BLANCHARD SURFACE GRINDER

Send for your free copies of "Work Done on the Blanchard," fourth edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Take a "tall bite" out of

bring them down with these

V-Belts by

high power costs!

DAYTON COG-BELT* "teeth!"

40% MORE H. P. PER BELT **FEWER BELTS**

FEWER PULLEY GROOVES **LONGER BELT LIFE**

Want to save 2 V-Belts on every 7-belt drive, more on bigger drives? You can with the premium Dayton Cog-Belt because each belt delivers 40% more horsepower, as 5 Cogs do the work of 7 ordinary V-Belts!

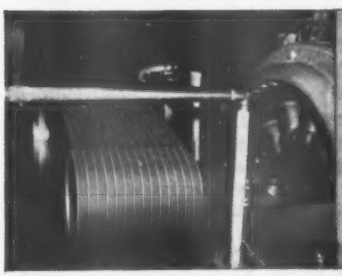
The reason: Cogs are the only V-Belt scientifically built to bend like your finger, for easy flexing, as the belt arches round pulleys. Compression strains are minimized, gripping power is increased. Cogs run cooler and last longer.

Want to save space? Cog-Belts let you use shorter center-to-center pulley distances—as much as 25% shorter.

Want to forget about V-Belts for the duration? Then convert to Cogs and their "40% Plus" performance, while you can. Give your Dayton Distributor the "high sign" of better power transmission—the arched finger that means Cog-Belt savings.

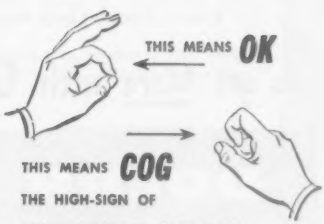
*T. M.

DAYTON RUBBER COMPANY • DAYTON 1, OHIO



COGS JOG GENERATOR!

A company making cheese boxes drives its plant generator with a 200 H.P. steam engine. The old flat-belt, countershaft drive never delivered enough h.p. to get maximum output from the generator. The Dayton Distributor sold them on converting to a Cog-Belt V-flat drive, direct to the generator. Now, the new drive delivers *more* h.p., at *slower* engine speed, with *less* fuel consumption, and—gets *maximum output* from the generator!



Dayton Rubber

WORLD'S LARGEST MANUFACTURER OF V-BELTS

Dependable DOERR* MOTORS
These improved Whiting hoists have fewer parts for lower maintenance with inherent features to provide maximum safety.
power
WHITING
ELECTRIC HOISTS

*Trade Mark

for increased production—greater handling efficiency

Whiting's wide acceptance in industry as a producer of reliable materials handling equipment is well known. We are privileged to be the major supplier of motors for Whiting Electric Chain Hoists.

you get More with DOERR!

DOERR
Electric Corporation
(Electro Machines, Inc.)
CEDARBURG, WISCONSIN

Electric Motors from 1/30 to 5 hp. Standard, or Designed to Your Specifications.

If you have an unusual motor problem please let us hear from you.

ACADIA
Synthetic Rubber

SHEETS
EXTRUSIONS
CUT PARTS
MOLDED PARTS
LATHE CUT WASHERS

As a material for an unlimited variety of uses, Acadia Synthetics are vastly superior in many essential qualities. They are readily compounded to varying degrees of elasticity, plasticity, resilience, etc., to meet specific operating conditions that call for high resistance to light, air, oil, age, wear and other factors.

Important, too, they are readily processed mechanically to close tolerances in practically any size, shape or form—die-cut, molded or extruded. You name the characteristics, or combination of qualities required. Acadia engineers will gladly help you select the right synthetic for maximum economy, service and satisfaction. *Write today!*

ACADIA Synthetic PRODUCTS
Processors of Synthetic Rubber and Plastics • Sheets • Extrusions • Molded Parts
DIVISION WESTERN FELT WORKS

Largest Independent Manufacturers and Cutters of Felt
4035-4117 Ogden Avenue, Chicago 23, Illinois

COPYFLEX

would get him prints on time!

Why wait when you can get top-quality prints *fast!* Simply use a COPYFLEX whiteprinter, which makes prints at an average cost of only 2¢ a sq. ft.

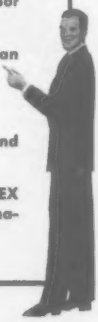
Seconds after your original is inserted, prints come out flat, stacked and ready for immediate use.

Bruning offers a COPYFLEX model for any volume or price requirement, plus an unexcelled range of sensitized papers, acetate-coated papers, cloths and films for every application.

Mail the coupon now for the full story.

Only COPYFLEX gives you all these advantages!

- No fumes because it uses no vapor developer
- No installation—simply make an electrical connection
- No exhausts or plumbing
- Wider range of sensitized and coated papers, cloths and films
- Anyone can operate a COPYFLEX machine with a 5-minute explanation



COPYFLEX 20 handles cut sheets or roll stock up to 42 in. wide. Lowest priced in its class.

BRUNING

Specialists in copying since 1897

CHARLES BRUNING CO., INC.

Dept. K12 — 100 Reade St. — New York 13, N. Y.

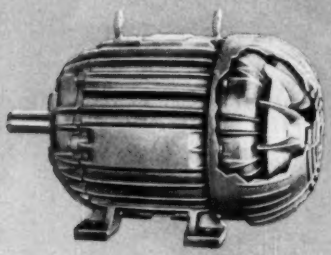
☐ Send me free booklet on COPYFLEX process and equipment.
☐ Show me COPYFLEX in action (no obligation).

Name.....Title.....

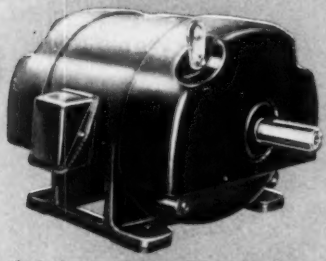
Company.....

Street.....

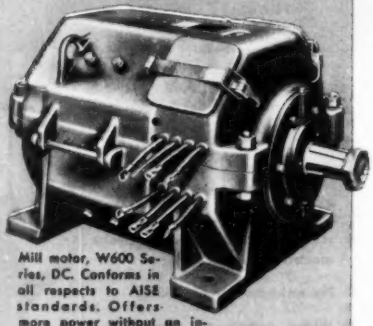
City.....Zone.....State.....



"Sealedpower" totally-enclosed squirrel-cage motor. Cooled and cleaned by exterior fan-driven air blast directed along radiating fins. 3 to 1 to 125 hp. Explosion-proof, 20 to 1 to 125 hp.



Squirrel-cage splash-proof Form BA. Has corrosion-resistant covers which prevent entrance of splashing liquids.



Mill motor, W600 Series, DC. Conforms in all respects to AISE standards. Offers more power without an increase in the frame size.

Want quick stops-often?

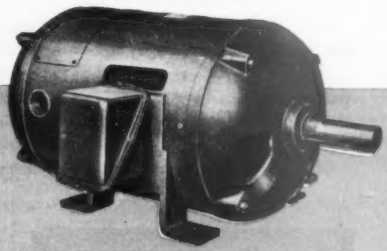
the

The positive-acting, tough and enduring C-W brake can be supplied with any Crocker-Wheeler integral motor. It is also available as a separate unit for mounting on double shaft extension NEMA standard D flange motors, frames 203-326, or C face motors, frames 364-405. It needs no mounting brackets or adapters.

GET BRAKE MOTOR BULLETIN SL-610-1, addressing your request to Elliott Company, Dept. F., Jeannette, Pa.

Crocker-Wheeler motors range from 1 to 200 hp. Larger Elliott motors and generators are built by the Ridgway Division at Ridgway, Pa.

...with the ELLIOTT CROCKER-WHEELER complete motor line, you can meet 'most any integral motor need!



Wound-rotor protected type Form BW. For slow, smooth acceleration, high starting torque with low starting current, or variable speed. Drip-proof, splash-proof, 1 to 200 hp.

W2-9

go • stop • go • stop • go • stop •

"THE *MASTER* OF *FLAME*"

FIRST..

in advanced engineering design and functional dependability . . .

FIRST..

in fire-stopping effectiveness with inexperienced operators . . .

MODEL 20-B

. . . . . Your BEST PROTECTION FOR FLAMMABLE LIQUID, GAS AND ELECTRICAL FIRES

ANSUL
DRY CHEMICAL
FIRE EXTINGUISHING EQUIPMENT

Ansul Dry Chemical Fire Extinguishers were FIRST with the GREATEST FIRE-KILLING RATINGS ever attained by hand and wheeled portable fire extinguishers*. No type or make of extinguisher has ever exceeded Ansul's effectiveness ratings for flammable liquid fires.

Ansul features include: 1) Patented nozzle which provides the most effective stream pattern for quick extinguishment of fires . . . in addition to forming a heat-shield for the operator. 2) Water-tight and corrosion-resistant construction. 3) Easy, on-the-spot recharging after use without special tools . . . and many others.

● Ansul Chemical Company is the *only* fire extinguisher manufacturer maintaining extensive chemical research laboratories in addition to a large engineering staff for research and development to maintain and improve the quality of its products . . . *Plus* the most extensive, best-equipped proving grounds in the industry.

Ansul *"PLUS-FIFTY"*® Dry Chemical is non-corrosive, non-abrasive and non-toxic. It is safe to use on electrical fires of any voltage. And ANSUL extinguishers need only be inspected annually, NOT RECHARGED, adding ECONOMY to GREATER FIRE-STOPPING EFFECTIVENESS.

*Get the facts. See comparative effectiveness ratings for various types of approved fire extinguishers based on tests by nationally recognized approval agencies. Write for file No. 802. You will receive complete information and other valuable data.

ANSUL
CHEMICAL COMPANY
Fire Extinguisher Division
MARINETTE • WISCONSIN

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES
ALSO MANUFACTURERS OF INDUSTRIAL CHEMICALS, REFRIGERANTS AND REFRIGERATION PRODUCTS

Use the coupon on page 131 or 226 to get these important . . .

Free NEW CATALOGS

Begins on page 131

INSTRUMENTS

8 Testing Equipment
You can see a complete line of measuring and production-line testing equipment in this 80-page catalog. Photographs, diagrams, applications, specifications. Complete index. General Electric Co.

9 Metal Detector
This 4-page bulletin has pictures and descriptions of a metal detector. Will show presence of tramp metal, either magnetic or non-magnetic, in any non-metallic substance. Instructions for installation, operation, service. Eriez Manufacturing Co.

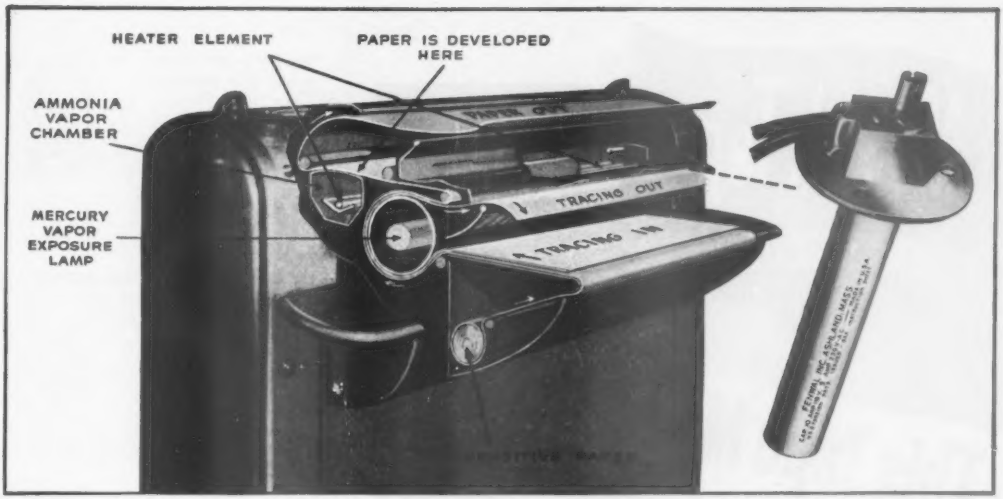
MATERIALS HANDLING

10 Motorized Hand Trucks
Here's a 16-page catalog illustrating a full line of "ride 'em or walk 'em" industrial trucks. Operating features and details, sections showing how lift attachments can help you with hard-to-handle loads. The Yale & Towne Manufacturing Co.

11 Industrial Trucks
If you want to know just what an industrial truck can do for you, this 24-page pocket-size catalog may have the answer. Facts on fork lift trucks, tractors, hand trucks; sections on safety, costs, and attachments. Clark Equipment Co.

12 Conveyors
Photos, sketches, and charts show each item in a line of conveyors and conveyor equipment. Information on how equipment works, what type of material it will handle. 28 pages. The Rapids-Standard Co., Inc.

Turn the page



Heat control problem in Ozalid reproduction machine solved

by Multi-Purpose Thermostat

When the Ozalid Streamliner reproduction machine was designed, a vital factor toward its successful performance was the maintenance of an even temperature within the developer tank.

After sensitive paper has been exposed, it is conveyed across the perforated top of the developer tank and developed by controlled aqua ammonia vapors. These vapors are superheated by a heater within the tank. Even heating at a specified temperature is imperative as, otherwise, uneven development results.

A low-cost THERMOSWITCH thermostat solves this heat control problem. It effectively maintains the vapor at a steady temperature for optimum developing conditions, by reacting both to vapor temperature and to radiant heat from the heater.

This application is but one of many types of control problems in which easy-to-install, easy-to-maintain Fenwal THERMOSWITCH thermostats have proved successful. Their activating control element is the single-metal shell that expands or contracts *instantaneously* with temperature changes, making or breaking the totally enclosed electrical contacts. Through this unique principle, THERMOSWITCH Units effectively control *many* variables where heat is a factor.

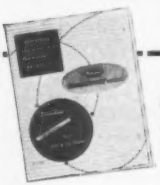
Find out now how Fenwal THERMOSWITCH Units can help you in *your* product. Mail coupon today.

Fenwal

THERMOSWITCH

The Precision, Multi-Purpose, Thermostat Control

SENSITIVE . . . *but only to heat*



FREE! **Get this bulletin . . . see what Fenwal THERMOSWITCH units can do for you.**
Just fill in coupon and mail . . . no obligation.

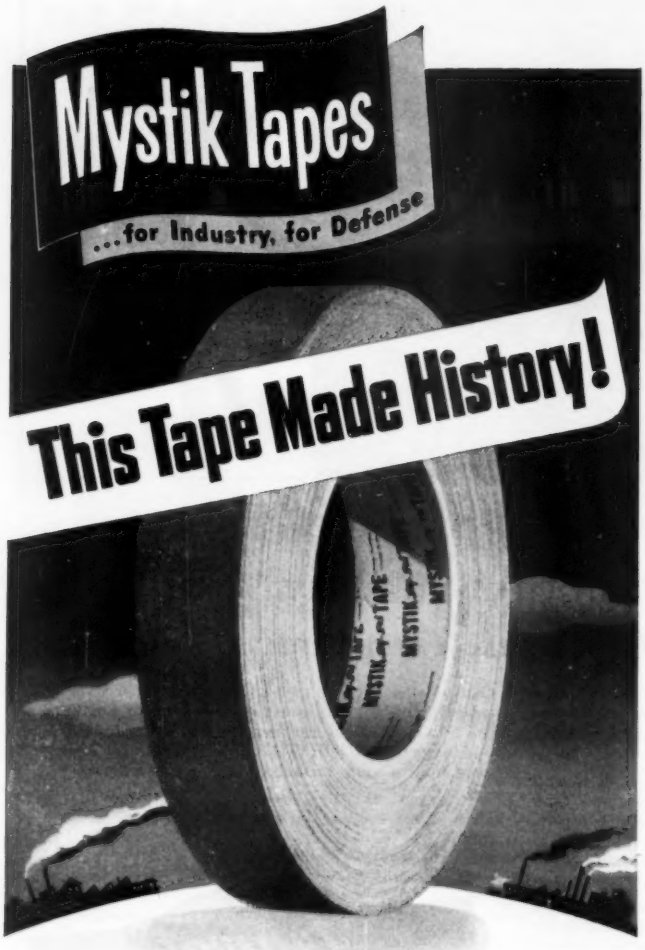
FENWAL, INCORPORATED, 61 Pleasant St., Ashland, Mass.
Los Angeles, Cal.
TEMPERATURE CONTROL ENGINEERS

Name ..... Position .....
Company .....
Street .....
City ..... Zone ..... State .....

I am chiefly interested in the applications checked:

- ☐ Heating
- ☐ Cooling
- ☐ Humidity Control or Detection
- ☐ Alarm (over-temperature, under-temperature)
- ☐ Vapor Level Control
- ☐ Timing (thermal)
- ☐ Radiant Heat Control
- ☐ Pressure Control (by controlling vapor temperature)

OTHER (Please fill in your special requirements) .....
.....
.....



- Mystik Cloth Tapes
- Mystik Paper Masking Tapes
- Mystik Protecto-Mask
- Mystik Dri-Pipe
- Mystik Spra-Mask
- Mystik Sand-blast

When the chips were down in World War II, MYSTIK Cloth Tapes supplied 65% of the total needs of industry and the armed forces. Again MYSTIK has the answers to tremendous supply and protective shipping problems. Whatever your needs—protective or production—you can rely on MYSTIK Tapes to meet the toughest demands . . . government specifications or *your* specifications! Write for full information and samples now. Mystik Adhesive Products, 2652 N. Kildare, Chicago 39.

Use the coupon on page 131 or 226 to get these important . . .

Free NEW CATALOGS

Begins on page 131

13 Coal Handling Equipment
A 44-page catalog gives you photographs and information on coal- and ash-handling equipment for industrial power plants. Shows you tested layouts of installations, unloading equipment, crushers, storage and transportation systems, and auxiliary equipment. Link-Belt Co.

14 Batch Control
Here's a comprehensive, 57-page catalog on weighing, proportioning, and batching systems. Dimensioned drawings, photographs. Application information tells you how the systems operate. Specification sheets, horsepower charts, and a section on sprockets are included in the catalog. Chain Belt Co.

15 Roller Chains
A 12-page catalog describes a line of double-pitch roller chains—both drive and conveyor types—and the standard equipment available from maker. Specification sheets, horsepower charts, and a section on sprockets are included. Chain Belt Co.

16 Pallets
Here's a folder on steel pallets. Shows how you can use them, describes how they're made, tells what loads they'll take. Photographs show the pallets in use. Sketches of details. Union Steel Products Co.

17 Cylinders
This 28-page catalog tells you all about maker's air, hydraulic, and water cylinders. Many diagrams, engineering specifications, complete parts list, capacity chart. "Imagination - teasers" show possible applications. Ortman-Miller Co.

Turn the page

the **RIGHT** horsepower
100 horsepower and smaller sizes

Every time on every application the power drive that is the best is the one that gives you the RIGHT horsepower, the RIGHT shaft speed and RIGHT where you need it . . . all combined into one compact power package.

Don't put up with makeshift assemblies when it's so easy to get a unit that's just right for each job.

Master Motors, available in thousands and thousands of types and ratings (up to 150 HP), give you an enormous selection of units designed so that they easily combine to give you a power drive that will add greatly to the compactness, safety and economy of each job. Open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single

it works out the same every time

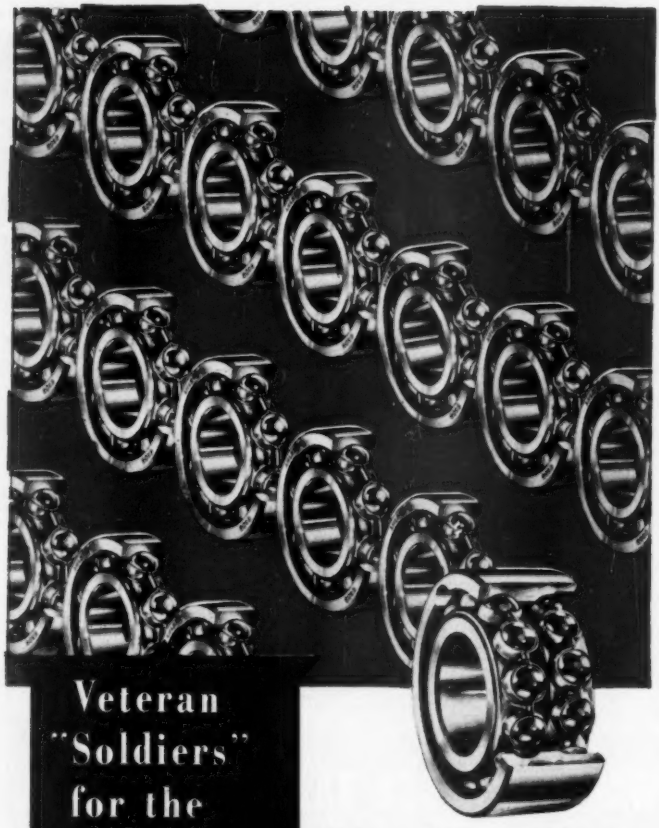
speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 432 to 1 ratio . . . with electric brakes . . . with mechanical variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best motor drive for YOU.

Select the RIGHT power drive from Master's broad line and you can increase the saleability of your motor driven products . . . improve the economy and productivity of your plant equipment.

the **RIGHT** shaft speed
Gear reduction ratios up to 432 to 1

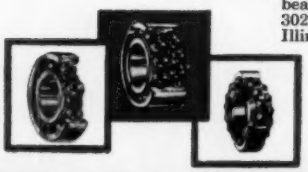
THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

and **RIGHT** where you want it



Veteran "Soldiers" for the Production Lines

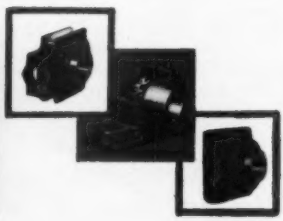
Today, more than ever, products must be "best ever" in construction and dependability. So must the machines depended on for uninterrupted production schedules. In this preparedness race, veteran soldiers, like Ahlberg precision ball bearings, are being specified for defense products and production machine maintenance as never before. The reason has been simply test and comparison, in search for the best, by manufacturers from coast-to-coast. Better products plus reduced operating and maintenance costs of the machines you use can well be yours by using Ahlberg precision ball bearings. Ahlberg Bearing Company, 3025 West 47th Street, Chicago 32, Illinois.



AHLBERG

PRECISIONeered Anti-Friction Products

Since 1908



Use the coupon on page 131 or 226 to get these important . . .

Free NEW CATALOGS

Begins on page 131

18 Wire Rope Slings
In this 48-page manual, you get illustrations, dimensions, weights, and safe working loads for 11 types of slings. Photographs of sling applications, sling fittings, and information on care and service of wire slings. Complete rigger's handbook included. Union Wire Rope Corp.

MECHANICAL EQUIPMENT

19 Welding Equipment
Specifications and illustrations of maker's full line of welding and cutting equipment and accessories are in this 63-page catalog. Chart list equipment for specific jobs. Victor Equipment Co.

20 Welding Electrodes
A 14-page catalog describes many types of alloy-welding electrodes. It tells about the properties of armor-welding electrodes; also electrodes for corrosion resistance and high temperature applications. Alloy Rods Co.

21 Flexible Couplings
Here are 12 pages of information on flexible couplings that provide precise alignment of rotating coupled shaft axes, according to the maker. Illustrations of various types, installation instructions, and rating tables. American Flexible Coupling Co.

22 Bearing Seals
A comprehensive catalog giving you 100 pages of information on oil and grease seals for bearings. Product illustrations, application information, performance chart, and parts list. A visual index helps you with selection. The Garlock Packing Co.

Turn the page

Repeat performance...with a new twist!

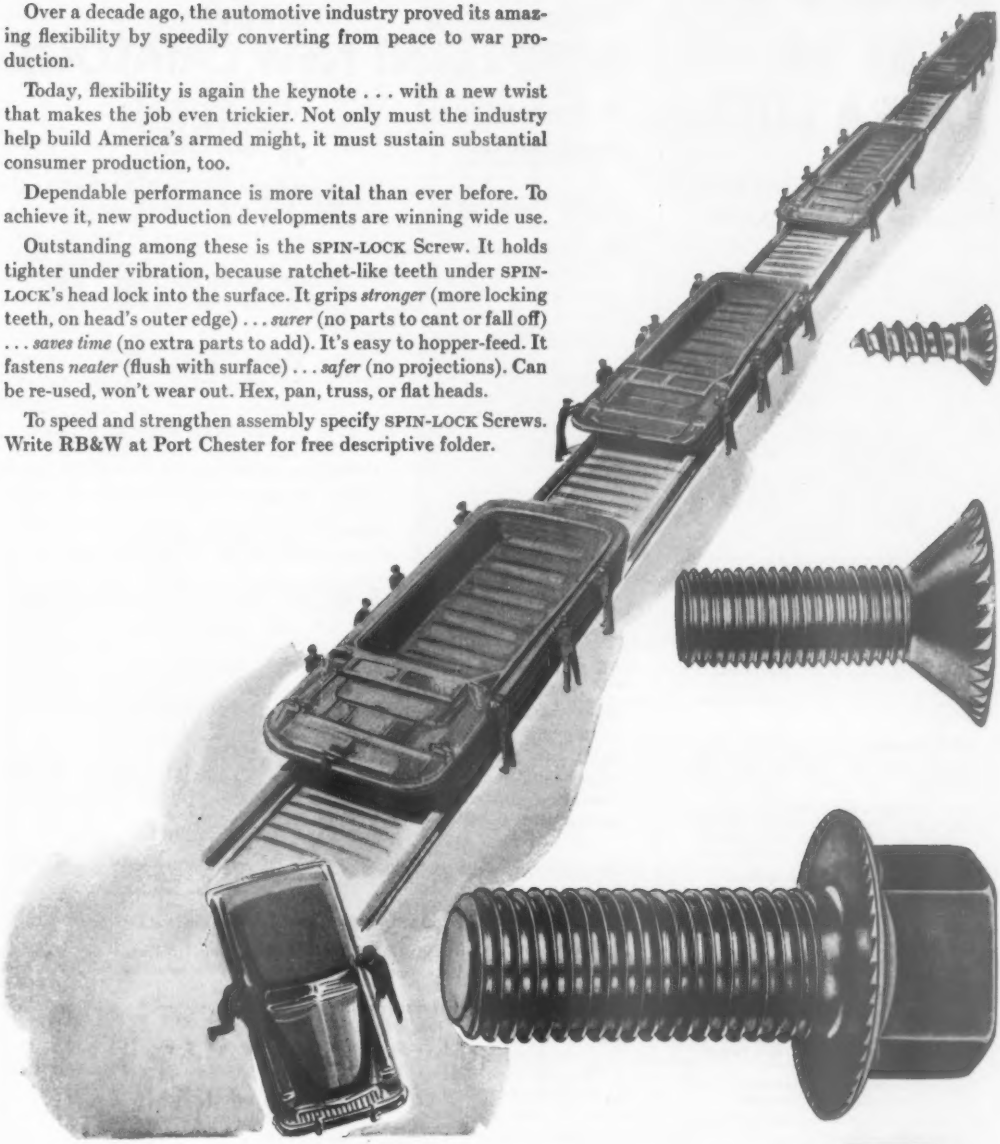
Over a decade ago, the automotive industry proved its amazing flexibility by speedily converting from peace to war production.

Today, flexibility is again the keynote . . . with a new twist that makes the job even trickier. Not only must the industry help build America's armed might, it must sustain substantial consumer production, too.

Dependable performance is more vital than ever before. To achieve it, new production developments are winning wide use.

Outstanding among these is the SPIN-LOCK Screw. It holds tighter under vibration, because ratchet-like teeth under SPIN-LOCK's head lock into the surface. It grips *stronger* (more locking teeth, on head's outer edge) . . . *surer* (no parts to cant or fall off) . . . *saves time* (no extra parts to add). It's easy to hopper-feed. It fastens *neater* (flush with surface) . . . *safer* (no projections). Can be re-used, won't wear out. Hex, pan, truss, or flat heads.

To speed and strengthen assembly specify SPIN-LOCK Screws. Write RB&W at Port Chester for free descriptive folder.



RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

RB&W
THE COMPLETE QUALITY LINE

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Dallas, Oakland. Sales agents at: Portland, Seattle.

106 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

NOW AT NO EXTRA COST

100% Serrated Safety Grating by A. O. Smith

A. O. Smith 100% serrated safety floor costs no more than a plain surface floor. You get premium quality with *positive* safety protection—*at no premium in price!*

100% non-slip surface is assured when you use A. O. Smith Safety Grating. All bearing bars and cross bars are fully serrated.

Ask your purchasing agent, design engineer or safety director to get full details on this grating that assures maximum safety in any application.

Floor grating • Stair treads
Catwalks • Trenching • Manways
Running boards

A.O.Smith

Safety Grating and Stair Treads

District Offices: Chicago 4 • Dallas 2
Houston 2 • Los Angeles 22 • New York 17
Pittsburgh 19 • Tulsa 3

CERTAIN TERRITORIES STILL AVAILABLE TO DISTRIBUTORS

A. O. Smith Corporation
Grating Division, Dept. FM-152
Milwaukee 1, Wisconsin

Without obligation send me complete information on your Safety Grating.

Name _____

Firm _____

Address _____

City _____ Zone ____ State _____

☐ I am interested in a Distributorship.

Use the coupon below — or the duplicate on page 131 to get these

IMPORTANT NEW Free CATALOGS

Begins on page 131

MISCELLANEOUS

23 Air Conditioning
This 16-page condensed catalog has sections for air conditioning, air-handling, and air cleaning equipment. Parts illustrations, features, specifications, summaries, and capacity tables. Air cleaning by electronic precipitation. Westinghouse Electric Corp.

24 Filters
This 8-page bulletin shows you how the sump-type liquid filters work. There are parts lists, engineering data, features, dimension charts, and application information. Temperature - viscosity chart for liquid petroleum products. Marvel Engineering Co.

25 Anti-Rust Paint
Here's a folder on a paint that maker says will prevent, absorb, or stop rust. Gives features of the paint, lists tests made under corrosive conditions. Application information, instructions for use. Master Bronze Powder Co.

26 Liquid Chiller
If temperature control for industrial processes is a must for you, this folder may point the way to increased production and decreased rejects, maker says. The liquid chiller is a complete unit for solution cooling. Acme Industries, Inc.

27 Vibration Control
This 12-page catalog on vibration-control products gives you pictures, applications, drawings, specifications, and capacities for each type. Lord Manufacturing Co.

28 Fire Protection
Here's a 26-page catalog to help you pick the right kind of maker's equipment to have available for any type of fire hazard. Shows how the products are used, gives hints on fire fighting techniques. Also a section on safety equipment. American-LaFrance-Foamite Corp.

For catalogs 29 through 38 see Plant Engineering Problems, page 228.

DUPLICATE COUPON ON PAGE 131

MAIL THIS COUPON FOR FREE CATALOGS *(Good until March 31, 1952)*

FACTORY MANAGEMENT & MAINTENANCE (January, 1952)
330 W. 42nd St., New York 18

I'm circling the numbers of the catalogs and bulletins I want:

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	

Name _____ Title _____

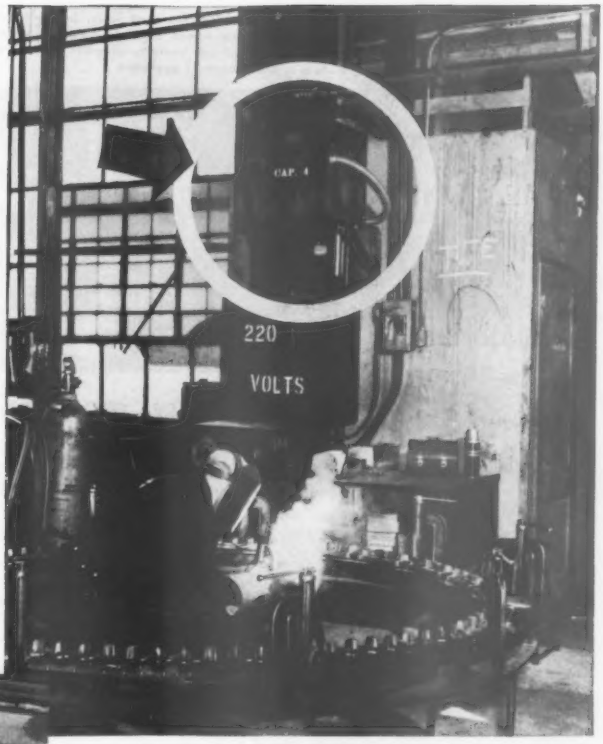
Company _____

Street Address _____

City _____ Zone _____ State _____

Electrical capacity doubled without new transformers or wiring

Cleveland Trencher Company installs G-E capacitors to handle twice the load on its electric circuits—finds saving in power costs pays for installation in three years



Cleveland Trencher Company manufactures large trench excavating machinery, uses several welders as well as induction motors for machine-tool drives. Together, these were responsible for the low power factor.

Capacitors were installed in out-of-the-way locations, near motors and welders, and are disconnected from the line when machinery is shut down.

Early in 1948, the Cleveland Trencher Company planned to increase its manufacturing capacity—found itself facing possible electrical overloads. Since power factor was down, the company decided on G-E capacitors instead of new wiring and main transformers. Ninety kvar were installed that year.

TWO YEARS LATER, LOAD WAS INCREASED AGAIN. Again capacitors provided the electrical capacity—60 kvar this time. Altogether load amperes have been doubled since 1948—without new wiring or transformers. And because power factor has been raised from 48 to 98 per cent, the saving in the power bill has already paid for the installation.

CAPACITORS WILL RELIEVE WIRING AND TRANSFORMERS of overload, allow for expansion, and improve voltage conditions. Also, if there is a power-factor or demand clause in your power contract, they often make possible worthwhile dollar savings.

Read what capacitors have done for others. Write for a copy of GEA-5167, "A Way to Cut Power Cost." Address *General Electric Company, Schenectady 5, N. Y.*

This new book can help you

"Capacitors for Industry" is a new, complete book on the application of capacitors in industrial installations. Full of up-to-date information, it is the work of four General Electric application and design engineers. "Capacitors for Industry" is the newest member of the General Electric-Wiley book series. Copies may be purchased from John Wiley and Sons, Inc., 440 Fifth Avenue, New York.

GENERAL ELECTRIC

407-204

Boards below list and locate all tools, jigs and fixtures and provide visible record of tools drawn by each employee. Cabinet at left contains complete records of all tools in crib or issued to operators.

DAYTON PUMP benefits 10 ways

.....saved $12,957 with McCASKEY TOOL CONTROL

In the first three months of their use of McCaskey Tool Control, the Dayton Pump and Mfg. Co. reduced tool expense $12,957 and attained the continuing results outlined below. Here are ten of the reasons why they are enthusiastic over results as briefed from facts received from Mr. Louis Wozar, Vice Pres. and Assoc. Gen. Mgr.:

1. Idle Tools Recovered . . . inventory of all special and standard tools, taken during McCaskey installation, revealed amazing quantity held in tool boxes and benches for only occasional jobs.

2. Tool Inventory Reduced 20% . . . by requiring operators to return tools not in use . . . by determining (1) proper inventory levels and (2) quantities to be purchased through tool usage records.

3. Less Tool Breakage . . . McCaskey procedure has made operators "tool conscious" and careful, reducing breakage.

4. Crib Performance More Efficient . . . McCaskey Index and Location Boards instantly provide tool number, description, size and location of all standard tools, special tools, jigs and fixtures; also show whether used on active or service parts and facilitate storage of more tools in less space.

5. Arguments and Accusations Stopped, Productive Hours Increased . . . tools in operators' possession quickly, definitely located.

6. Blueprints Quickly Located . . . eliminates confusion and delay, when prints are recalled, and prevents costly errors from use of obsolete prints not turned in or found.

7. Accurate Tool Usage Records . . . now available for quick check-up on performance data and obsolescence.

8. Perpetual Inventory . . . accurate, up-to-the-minute record of available tools easily maintained by positive procedure.

9. More Productive Time for Machines, Tools and Men . . . thru faster crib service . . . no lost motions . . . no dependence on attendants' memory . . . no laborious clerical work.

10. Efficient Operation with Inexperienced Attendants . . . new personnel quickly and easily trained for smooth, efficient operation.

These advantages point to continued savings for Dayton Pump . . . and for you, too. Investigate NOW! Mail coupon for step-by-step procedure and additional facts.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Send me the facts on McCaskey Tool Crib Control.

Name .....

Position .....

Company .....

Address .....

FMM 1-52

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY
TOOLS • COSTS • PAYROLL
THE McCASKEY REGISTER CO.
ALLIANCE, OHIO
McCaskey Systems, Ltd., Galt, Canada
The McCaskey Register Co., Watford, England

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 131 or 226.

ARE IMPURITIES IN FLUID LINES CAUSING SHUTDOWNS? Maybe a pipe-line strainer can help you. J. A. Zurn Mfg. Co. says they're easy to clean, give low pressure drop, and require little space. Used correctly they can protect control devices and product purity. Data Manual No. 951. *(Circle No. 29 on coupon, page 131 or 226.)*

TO HELP YOU KNOW WHICH HARD-FACING WELDING RODS TO USE, Amsco has put out a *Hardfacing Rod Selection Guide.* Shows where to use each kind, and gives recommended rod, size, and method of application. *(Circle No. 30 on coupon, page 131 or 226.)*

LOOKING FOR A GOOD LOW-PRESSURE AIR SUPPLY? If you are, maybe a turbo-compressor is your answer. Spencer Turbine Co. outlines operating and maintenance advantages of turbo-compressors, offers data book No. 107-C to show how to use them. *(Circle No. 31 on coupon, page 131 or 226.)*

ARE SNOWBANKS SLOWING UP PLANT OPERATIONS? Then why not mechanize? Trio Mfg. Co. says their rotary Snow Jet just eats up snow, regardless of depth. *(Circle No. 32 on coupon, page 131 or 226.)*

WHEN UNIT HEATERS BEGIN TO GIVE LESS HEAT, they may be water--bound. Armstrong Machine Works has devoted a full issue (Vol. 20, No. 5, 1951) of its monthly bulletin to tell you how to select and install steam traps, and what they'll do for you. *(Circle No. 33 on coupon, page 131 or 226.)*

Turn the page

Striking Campaign in

The Saturday Evening POST

continued for 1952 . . . users of Phillips Cross-Recessed-Head Screws reap the benefit

Once again readers of The SATURDAY EVENING POST are being told to look for the clue to quality: Phillips Cross-Recessed-Head Screws. Take advantage of this powerful promotion by assembling your products with these quickly identified fasteners. You save time, work, money because Phillips Screws . . . Wood, Machine, Tapping or "Sems" . . . start faster, eliminate driver skids, damaged parts, split screw heads. What's more, they add structural strength. Be sure to include the clue to quality in your specifications!

X marks the spot . . . the mark of extra quality

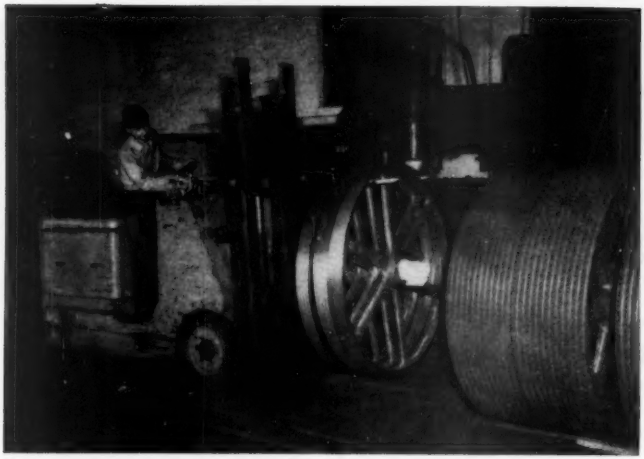
PHILLIPS *Cross-Recessed-Head* **SCREWS**

manufactured by

AMERICAN SCREW CO. • ATLANTIC SCREW WORKS, INC.
THE BLAKE & JOHNSON CO. • CAMCAR SCREW & MFG. CORP.
CENTRAL SCREW CO. • CONTINENTAL SCREW CO. • THE EAGLE LOCK CO.
ELCO TOOL AND SCREW CORP. • GREAT LAKES SCREW CORP.
THE H. M. HARPER CO. • ILLINOIS TOOL WORKS • THE LAMSON & SESSIONS CO.
NATIONAL LOCK CO. • NATIONAL SCREW & MFG. CO.
PARKER-KALON CORP. • PHEOLL MFG. CO.
ROCKFORD SCREW PRODUCTS CO. • SCOVILL MFG. CO.
THE SOUTHINGTON HDWE. MFG. CO. • STERLING BOLT CO.
STRONGHOLD SCREW PRODUCTS, INC. • WALES-BEECH CORP.

Can you find the clue...
...to quality? X marks the spot...
Yes! a PHILLIPS SCREW
PERFECTLY MATED!
Only Phillips Drivers are perfectly mated to Phillips Screws. Look for the name Phillips on the shank.

THE FASTENERS OF TODAY . . . AND OF THE FUTURE



Characteristics That Precisely Fit the Needs

A material-handling industrial truck makes as many as 45 stops and starts per minute—ahead, back, up, down. For operating efficiency, it requires instant power for starting and acceleration but should consume no power during the stops and the preceding coasting and braking intervals.

The kind of power that precisely meets these needs is ELECTRIC POWER supplied by an EDISON Nickel-Iron-Alkaline Storage Battery and applied by a high-torque d-c ELECTRIC MOTOR through instant on-off controls. And the battery-charging current, produced wholesale by a central station, is the lowest-cost power available.

EDISON batteries have cells of steel, an alkaline electrolyte that preserves steel and foolproof operating principle. They accept charge rapidly; are not injured by overdischarging . . . by freezing . . . by standing idle . . . by short-circuiting, reverse charging or other electrical accidents. They are the longest-lived of all types of batteries—so long lived, in fact, that they make big savings in depreciation costs per year. They are so trouble-free that they not only cut maintenance costs; they prevent unscheduled down-time of the truck. When exchanged at convenient intervals, they afford round-the-clock power for the truck with the nth degree of dependability.

ELECTRIC MOTORS bring to industrial-truck operation the same trouble-free dependability that they afford in stationary machine drives. They also give quieter, cleaner, safer truck operation than any other kind of power. For more information send for free copy of our bulletin *Modern Material Handling* which analyses the power requirements of handling work. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. Thomas A. Edison of Canada, Limited, Montreal.

You can always rely on

EDISON

Nickel-Iron-Alkaline Storage Batteries

Begins on page 228

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 131 or 226.

HERE'S A GOOD WAY TO CUT MAINTENANCE COSTS ON HIGH-BAY FIXTURES. Lower 'em for service. According to Thompson Electric Co., Catalog No. 50, their hangers also provide maximum safety for service crews. *(Circle No. 34 on coupon, page 131 or 226.)*

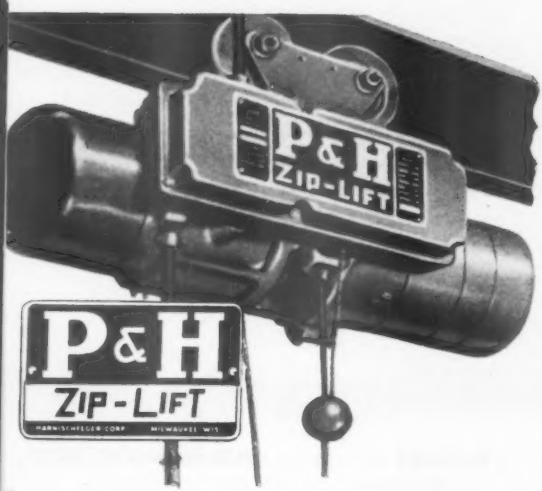
MAYBE YOU CAN CUT YOUR INVENTORY OF LUBRICANTS TO SEVEN ITEMS, says Keystone Lubricating Co., in Bulletin BK-19. They tell you how their specialized lubricants can cover the majority of your plant operating requiremets. *(Circle No. 35 on coupon, page 131 or 226.)*

NEED A COURT RECORD TO PROVE YOU'RE NOT A DUST NUISANCE? Minneapolis-Honeywell's new recorder continuously charts dust content of any atmosphere where there's at least 0.003 grain of dust per cubic foot. Data Sheet No. 10.14-6. *(Circle No. 36 on coupon, page 131 or 226.)*

WHY NOT SET UP A RELIABLE AIR-RAID SIREN CONTROL? You'll minimize risks of operating failures and eliminate need for relay maintenance, according to H-B Instrument Co.'s. *Air-Raid Siren Control.* All you need is a hermetically sealed mercury plunger load relay. *(Circle No. 37 on coupon, page 131 or 226.)*

WANT TO TEST HOW WELL YOUR DUST CLEANING SYSTEM'S OPERATING? Bulletin WP-50 of the Western Precipitation Corp. tells all you need to know to conduct accurate performance tests. *(Circle No. 38 on coupon, page 131 or 226.)*

Free your hands with a ZIP!



HANDLE IT "THRU-THE-AIR"—FASTER—FOR LESS

Skilled hands shouldn't be load-lifters. There's more important work for them to do — more profitably!

Take the hands out of handling — make your man-hours more productive by using Zip-Lifts wherever loads must be handled frequently — along assembly lines, beside machine tools, etc. Make it a push button job.

There's nothing like the Zip-Lift for all-round service and quality — America's favorite wire rope electric hoist.

You pay so little more for ADDED VALUES like these—

SAFER — Full magnetic control with current reduced to 110 volts at push button. Plugging crane type limit switch. Large double brakes. P&H has never stretched a motor rating. That's *your* protection.

LIFETIME CONSTRUCTION — Precision built — shaved gears run in oil — grease-sealed bearings — fully enclosed.

SEE YOUR ZIP-LIFT DEALER, or write us for Bulletin H-20 — it's filled with time-saving ideas for you.

P&H ELECTRIC HOISTS

4525 W. National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

P&H

EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS & ELECTRODES • SOIL STABILIZERS • CRAWLER & TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PRE-ASSEMBLED HOMES

NOW!

Get immediate delivery on lighting panels up to 42 circuits from your BULLDOG supplier's stocks

Another great forward step by BullDog to simplify ordering, stocking and use of electrical equipment

The basic device principle has now been extended to all Pushmatic Electri-Center lighting panelboards up to 42 circuits.

BullDog Electri-Center Panelboards are now available from local stocks. Just choose the basic device that fits your circuit requirements . . . select the additional Pushmatic unit you need at the time . . . and get a complete panelboard right over the counter. A flexible panelboard that lets you *add extra circuits later*, when needed.

Now, no more special ordering and long waits when you need panelboards in a hurry. You get immediate delivery on a top-quality item that was once custom-made. You get savings, because these BullDog panelboards are now mass-produced, and cost less. Only 5 panels replace hundreds of catalog numbers, cover all your needs up to 42 circuits . . . make ordering and stocking easier.

Ask your local supplier for BullDog Pushmatic Electri-Center Panelboards.

NOW FROM YOUR SUPPLIER'S STOCKS . . .

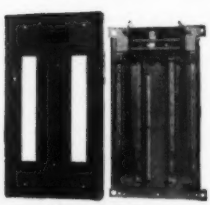
5 BOXES →

26", 32" and 38" high. All 20" wide; 5½" deep. Ample knockouts.

5 FRONTS →

Either flush or surface type. Sturdy. Attractive gray finish. Separately packaged.

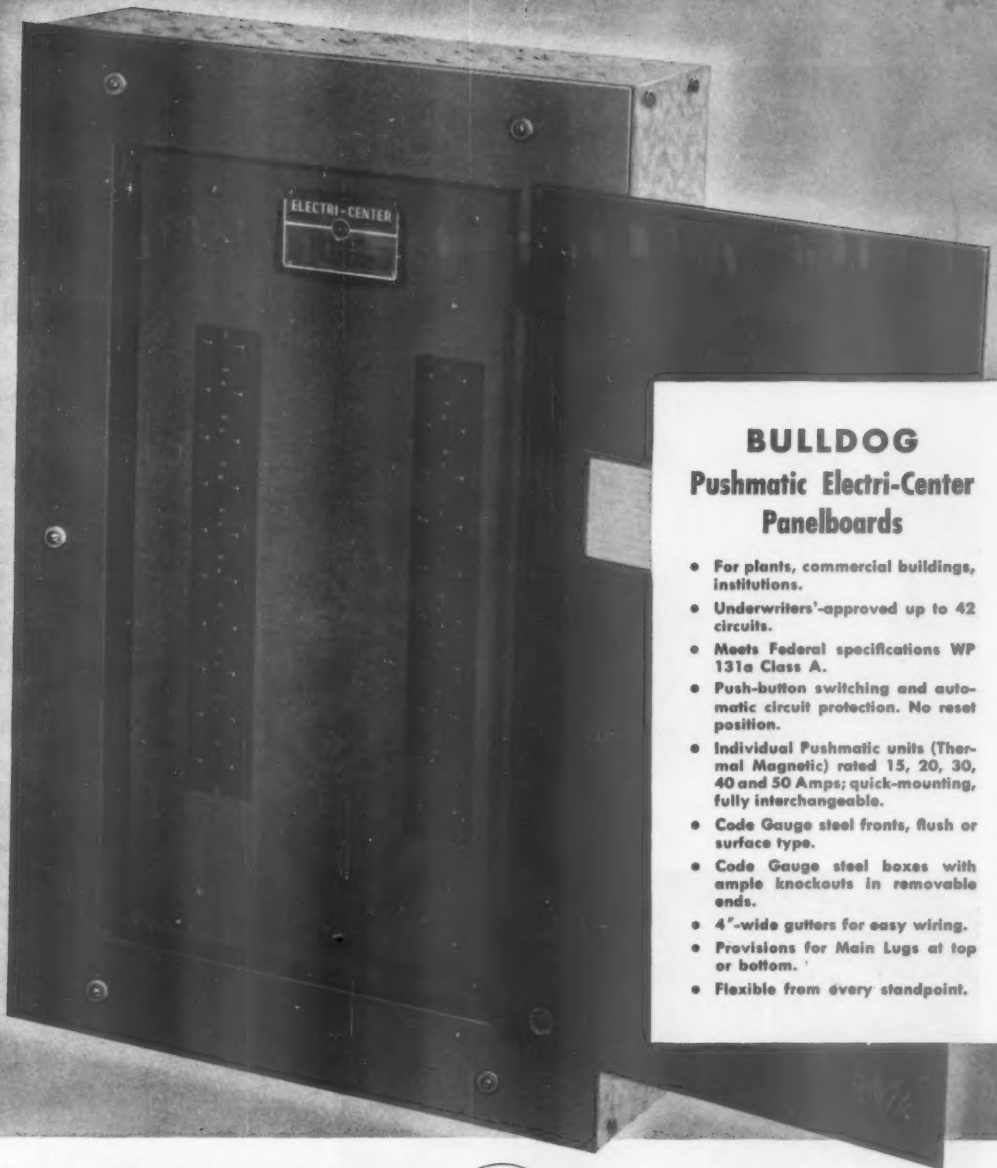
5 INTERIORS →



Basic device principle. Four Pushmatic circuit breakers and fillers supplied with the two single-phase devices; six with the three 3-phase, 4-wire devices.

PLUS PUSHMATIC UNITS →

Thermal Magnetic Pushmatics. Famous "Push it's ON. Push it's OFF. Push it's ON again" operation. Stock them yourself . . . have them ready when you need additional circuits.



BULLDOG
Pushmatic Electri-Center Panelboards

- For plants, commercial buildings, institutions.
- Underwriters'-approved up to 42 circuits.
- Meets Federal specifications WP 131a Class A.
- Push-button switching and automatic circuit protection. No reset position.
- Individual Pushmatic units (Thermal Magnetic) rated 15, 20, 30, 40 and 50 Amps; quick-mounting, fully interchangeable.
- Code Gauge steel fronts, flush or surface type.
- Code Gauge steel boxes with ample knockouts in removable ends.
- 4"-wide gutters for easy wiring.
- Provisions for Main Lugs at top or bottom.
- Flexible from every standpoint.

ELIMINATE HUNDREDS OF CONFUSING CATALOG NUMBERS AND LET *YOU* GET IMMEDIATE DELIVERY ON TWO COMPLETE BULLDOG PANELBOARD LINES

Single Phase, 3-wire, Solid Neutral

(P2B-304-28L) 28 circuits Max. Mains 200 amp.
(P2B-304-40L) 40 circuits Max. Mains 200 amp.

3 Phase, 4-wire, Solid Neutral

(P3B-406-21L) 21 circuits Max. Mains 100 amp.
(P3B-406-30L) 30 circuits Max. Mains 100 amp.
(P3B-406-42L) 42 circuits Max. Mains 200 amp.

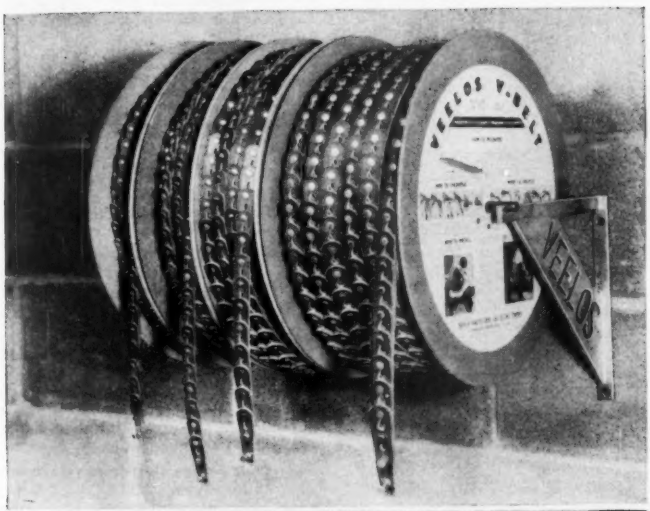
WRITE FOR DESCRIPTIVE BULLETIN 513

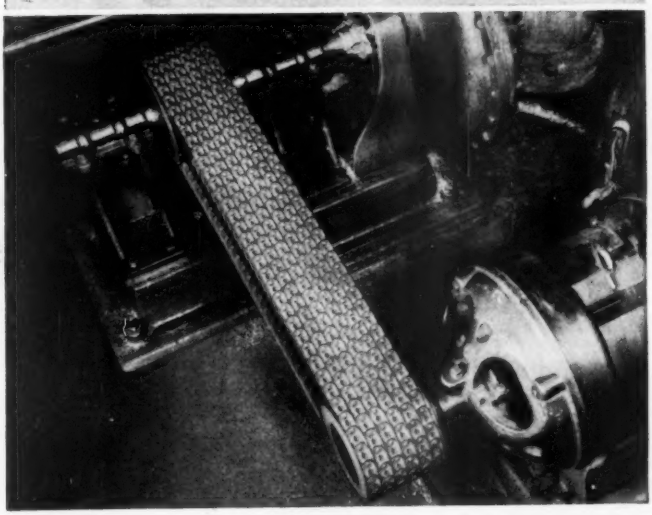
BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

Veelos—*the Adjustable V-Belt*
Pays for Itself





In Inventory . . .

Veelos pays for itself by reducing required v-belt stocks. Just 4 reels of Veelos cover ***every*** v-belt need (up to 316 sizes) in the O, A, B and C widths. Stock only one reel for each width of belt you use—and *any length is readily available.*

In Maintenance . . .

Veelos pays for itself because it can be installed quickly and easily without dismantling outboard bearings or moving motor. Individual belts can be adjusted by simply removing or adding links.

In Operating Efficiency . . .

Veelos pays for itself because uniform tension can be maintained on all belts to provide vibrationless, full power delivery. Simple adjustment of each belt means that *matched sets stay matched.*

Write for your copy of the Veelos Data Book. It gives the complete story on why *Veelos pays for itself.*

MANHEIM MANUFACTURING & BELTING COMPANY
Manheim, Pennsylvania

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all widths in three types; regular, oil-proof and static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. Veelos is known as VEELINK outside the United States.

VEELOS
THE LINK
V-BELT

BUFFALO
better-built

STAINLESS STEEL
FIRE-EXTINGUISHERS

Grain dust ignited by sparks from a cutting torch caused this $1,000,000 fire at H. W. Rickel & Co. malt plant in Detroit.

Disastrous fires such as this can be stopped when they start by quick action with Buffalo better-built Extinguishers. Quick action is easy when Buffalo *Stainless Steel* Extinguishers are close by. They are easier to handle because their Stainless Steel construction is one-third lighter, yet stronger, than ordinary types.

Buffalo manufactures a complete line of extinguishers for positive protection from every fire hazard. Order Buffalo fire protection today! Consult your Classified Telephone Directory or write for your nearest Buffalo distributor.

UNDERWRITERS' LABORATORIES AND FACTORY MUTUAL APPROVED

BUFFALO FIRE APPLIANCE
CORPORATION
DAYTON 1, OHIO

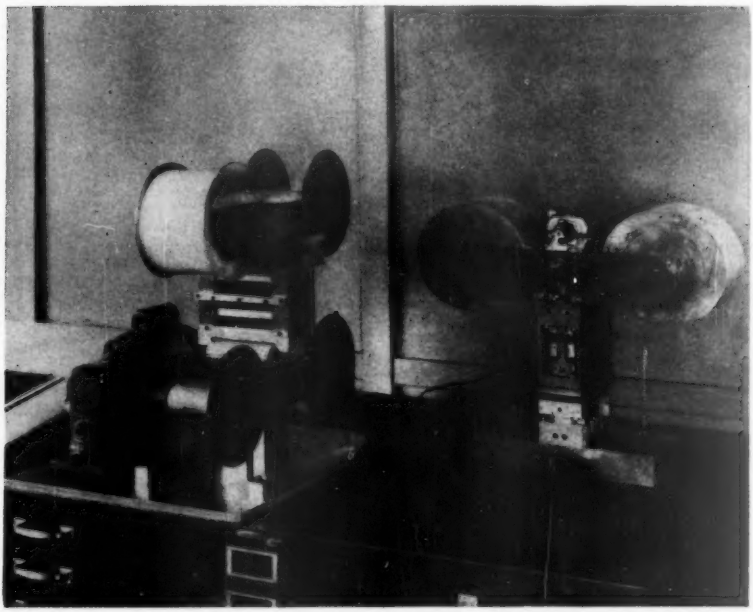
YOU MUSTN'T MISS—

INDUSTRIAL NEWS, BEGINNING ON THIS PAGE

TIMELY HINTS TO BETTER MANAGEMENT ON PAGE 246

QUOTES FROM INDUSTRY'S LEADERS ON PAGE 254

IDEAS TO STIMULATE YOUR THINKING, ON EVERY PAGE



FEED PUNCHED TAPE (left) into pickup (right) and Daco's new . . .

INDUSTRIAL NEWS

...Robot Runs Machine Tools No Hands

HOW'D YOU LIKE to sit down in your office and control production runs on a whole shopful of machine tools — any kind, anywhere? All you need is the new robot brain developed by Daco Machine & Tool Co., Brooklyn, N. Y.

The device works something like teletype. You punch out your blueprint by perforating a special paper tape. Then you feed the tape into an electronic pickup that translates the tape message into electric impulses. These start up motors in distant machine tools. The tools do the rest.

In the same way, you can run any kind of machine tool over any distance. Manpower is only required to load and unload tools, and to check part tolerances.

Daco claims the robot is ideal for use on long repetitive runs in metal cutting operations. There are no human operators to make mistakes; and the robot can't make them. But the production tool can. Inaccurately machined parts can be caused by such ordinary foul-ups as worn cutting tools and faulty motors.

Turn the page

Ask yourself these speed reduction questions . . .

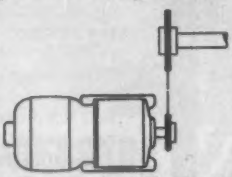
1 **Do I want high-ratio reduction with right-angle takeoff?**

Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.

Then your answer is a LINK-BELT Worm Gear Drive

Reduction ratios: 3.1:1 to 8000:1
Torque: 1,400 to 123,000 in. lbs.
Output shaft rpm: 0.22 to 564

2 **Is space at a premium?**

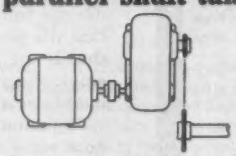


Drawing shows gearmotor with roller chain drive.

Then your answer is a LINK-BELT Gearmotor

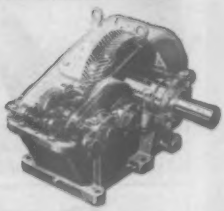
Reduction ratios: 6.2:1 to 292:1
Hp range: 1 to 30
Output shaft rpm: 6 to 280

3 **Will I need high hp capacity with parallel shaft takeoff?**



Drawing shows motor with herringbone gear and roller chain drives

Then your answer is a LINK-BELT Herringbone Gear Drive



Reduction ratios: 2.84:1 to 318:1
Hp range: ½ to 1000
Output shaft rpm: 2 to 600

Yes, LINK-BELT builds all 3

WHATEVER factor governs your speed reducer selection—ratio, space, shaft position, shock loading—you can get the exact answer to your needs from Link-Belt's complete line of enclosed gear drives.

For Link-Belt builds a full range of sizes and ratios in all three types—Helical, Herringbone and Worm. When a Link-Belt power transmission engineer analyzes your conditions, he can recommend the specific drive to meet your specialized requirements.

For complete information, call the Link-Belt office near you.

LINK-BELT

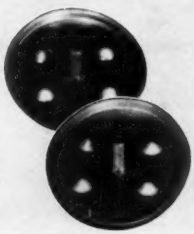
ENCLOSED GEAR DRIVES

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,050

IDEAS

FOR SPEEDING PRODUCTION

The installation and operation of the Wheelabrator offers many possibilities for meeting expanded production schedules, and at the same time using even less manpower. Users have found that this versatile cleaning, finishing and surface preparation machine does the job in minutes instead of in hours. For proof, see the case histories below:



SAVES 21 HOURS DAILY PRIOR TO RUBBERIZING

To prepare the surfaces of metal parts for rubberizing, Reeves Rubber, Inc., replaced costly, time-consuming air blasting with a Wheelabrator. Results: rubber adheres tenaciously to the Wheelabrator surface, preparation time slashed 21 hours daily; cost saving of from 50% to 82%.

CUTS CLEANING TIME 86% FOR WELDMENTS

The B. H. Aircraft Co. is currently using the Wheelabrator for cleaning prior to the spot welding and/or silver brazing of pipe assemblies. The average time for cleaning is about 14% of the time for air blasting.

The WHEELABRATOR Unit

WHEELABRATOR HAS UNLIMITED APPLICATIONS

For example: Reducing porosity of die castings; Deflashing plastic molded parts; Surface preparation for galvanizing, plating, enameling, glass coating, bonding; Improving deep drawing operations; Etching steel mill rolls; Removing mica from molded rubber; Cleaning castings and forgings.

THE AMERICAN WHEELABRATOR & EQUIPMENT CORP.

YOU MUSTN'T MISS—

Begins on page 236

How To Tell Who's Small Business

The Department of Commerce, after two years of study, has come up with a definition of small business. For years businessmen have looked for an easy way to tell how "big" their companies are. And since Korea they've been wondering just who qualifies for help from the Small Defense Plants Administration.

Here's what the Commerce Department says:

The Basic Rule · If you have 100 employees or less in your plants, you're small business. If you employ more than 2500, you're operating a big business. That's easy enough. But what happens if you have from 101 to 2499 employees? There's an answer to that one, too.

The Rule Book · Just get a copy of *Size Classification of Manufacturers* from your local Department of Commerce office. Cost 10¢. Eleven broad manufacturing industries are listed. Under one you will find the category that fits your business. Opposite that is the maximum number of employees you may have and still qualify as a small business.

Minimum Figures Vary · You'll note right away that minimum figures vary for each category of industry. For instance, if you make conveyors with 500 employees, you're big business; but if you make steam engines and turbines with 2500 workers, you're small business.

Reason, according to Charles Sawyer, Secretary of Commerce: "Small size is a relative term. What is large in one industry may be small in another."

So, consideration was given to the size factor, and the degree of concentration of output in each industry.

Turn the page

HYPRESSURE Jenny STEAM CLEANER

SAVES TIME and EXPENSE IN ANY INDUSTRY

No matter how *special* your cleaning requirements are, Hypressure Jenny steam cleaning provides the fastest, most effective method known for removing dirt, grime, grease, oil, product accumulations, paint, or other substances from your production machinery, floors, walls and equipment. Besides cleaning right down to the bare surface, Jenny sterilizes and deodorizes as it cleans!

You can reduce cleaning time and labor expense 90%, because one man with Jenny can do more cleaning in an hour than 10 men can accomplish in the same time by bucket-brush-and-solvent methods.

In factories, shops, mills, mines, garages, food processing plants, and in many other industries, Jenny is saving up to 40% in man-hours and labor costs by cleaning equipment *before repairs* thus eliminating the non-productive time mechanics must spend fighting oil and grease.

You gain extra productive hours, without added manpower, with Jenny on the job!

We'd like to send you the full story, without obligation. Why not write us today?

HYPRESSURE JENNY DIVISION

HOMESTEAD VALVE MANUFACTURING COMPANY

"Serving Since 1892"

P. O. BOX 86 CORAOPOLIS, PA.

USERS OF ASPHALT • ASBESTOS • MAGNESIA PRODUCTS

stop hunting

for specifications to match products —and vice versa!...

Find the information you need in this new CAREY manual —listing asphalt, asbestos and magnesia products and specifications!

This manual will quickly show you what products fit a particular specification—and vice versa . . . help you select alternates for scarce materials. It's complete! Among specifications included are Army, Navy, MIL, Federal, ASTM. Developed for the busy industrial designer, engineer, purchasing or maintenance executive or architect, you can count on it to save you hours every day, help speed production for defense. A copy is yours without obligation. Just ask your Carey Industrial Sales Engineer—or fill in coupon and mail today.

A Good Man to Know— Your Carey Industrial Sales Engineer

His training and experience make him your valuable ally in the solution of problems in building construction and maintenance—manufacturing and process operations. Call him in to show you how Carey products can help you get the job done, *faster*—for less!

The Philip Carey Mfg. Company
Lockland, Cincinnati 15, Ohio
Department F-1
Gentlemen: Please rush me my free copy of the Carey Reference Manual for Asphalt, Asbestos and Magnesia Products.

NAME.....

COMPANY.....

ADDRESS.....

CITY..... STATE .....

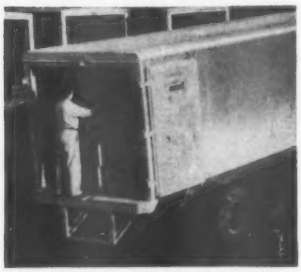
Carey

The Philip Carey Mfg. Co., Lockland, Cincinnati 15, Ohio
In Canada: The Philip Carey Co., Ltd., 277 Duke St., Montreal 3, P.Q.

ASPHALT • ASBESTOS • MAGNESIA PRODUCTS

YOU MUSTN'T MISS—

Begins on page 236



LOOKS LIKE METAL, but it isn't. This trailer is made of plastic-laminated plywood that . . .

. . . Acts Like Metal— But Uses None

That's Unicel, the cellular plastic-laminated plywood. Pressed Steel Car Co., Chicago, has used the material in a new type of 32-ft. trailer (above) and claims it has these advantages over similar metal trailers:

- It's more rigid, more "roadable," pulls more easily.
- It has more cargo space.
- It's moisture-proof.
- It's better insulated.
- It's faster to produce.

Science Foundation Gets $3.5-Million

President Truman recently signed an appropriation bill giving the National Science Foundation $3.5-million for the coming year. This was $10-million less than NSF had requested (FACTORY, November 1951).

Here's where the funds will go, according to Dr. Alan T. Waterman, NSF director:

- About $1.5-million for supporting basic research in science and engineering.
- $1.35-million for science education.
- The remaining $650,000 toward developing a national policy for basic research and education.

Turn the page

FREE BOOK

HOW RCA 2-WAY RADIO

SAVES TIME · SPEEDS OPERATIONS · "STRETCHES" EQUIPMENT

. . . tells in non-technical language what 2-way radio is and what it does . . . shows how it works. You'll see how management can know at all times what's going on because it has voice contact with roving crews and with men at remote locations.

. . . shows how RCA 2-way radio expedites materials handling, coordinates survey and construction projects, and eliminates aimless driving in tracking down trouble . . . It reports how 2-way radio is used to route cars and trucks, to mobilize repair crews fast, and to prevent disruption to production cycles.

. . . also covers the survey facilities offered by RCA to determine the 2-way radio system that best meets your business needs . . . includes a digest of the FCC rules regulating industrial radio service . . . reveals how to co-operate with industry's frequency allocation committees.

* * *

This brochure is yours for the asking. (*In Canada, write: RCA Victor Limited, Montreal.*)

RCA
2-WAY RADIO FOR INDUSTRY
FOR
OIL AND GAS INDUSTRY · PIPELINES
PUBLIC UTILITIES · TIMBER & LOGGING
MOTION PICTURE COMPANIES · NEWSPAPERS
CONSTRUCTION · MANUFACTURING · MINING
SPEEDY COMMUNICATION WITH ALL MEN AND EQUIPMENT

MAIL TODAY

RCA ENGINEERING PRODUCTS
Dept. 48A,
Camden, N. J.

Send me a free copy of "2-way Radio for Industry."

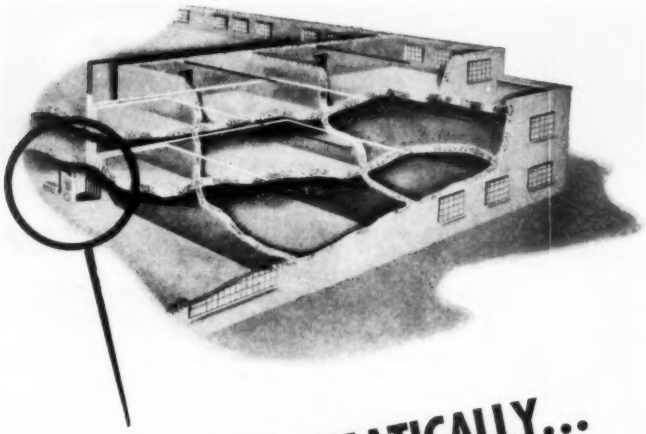
Name_____

Firm_____

Address_____

City_____ State_____

RCA RADIO CORPORATION of AMERICA



DETECTS AUTOMATICALLY... SMOKE, SMOLDERING AND FIRE

at any location in your plant or warehouse!

Each fire hazard point gets highly efficient, round-the-clock fire watchman service simultaneously when a building is completely protected with a modern, fully approved C-O-TWO Automatic Smoke Detecting System.

The first whiff of smoke sets off an alarm, based on an exclusive operating principle . . . no chance of smoke, smoldering or fire spreading . . . instantly, the air conditioning shuts down, doors and dampers close, operating equipment stops and fire extinguishing systems actuate . . . a truly automatic fire watchman.

Four types of smoke detectors and several different installation arrangements are available to fit your particular needs...single space systems, double space systems, multiple space systems, air conditioning duct systems . . . all function by drawing continuous air samples through simple piping to a smoke detector.

Actual fire tests made by the Underwriters' Laboratories, Inc. show that fire detection with this type of smoke detecting equipment is much quicker than other methods . . . because usually there is smoke or smoldering before flames break out.

Remember fire doesn't wait . . . so, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning economical, fully approved fire protection facilities. Write today for complete free information.

C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

YOU MUSTN'T MISS—

Begins on page 236

G. M. to Build Dual-Purpose Plant

General Motors is planning dual-purpose plants for peace-defense production. First one's going up at Arlington, Texas, and is scheduled for completion in 1953. In peacetime G. M. will use it to make automotive parts; in time of defense, jet engines.

General Motors' idea is to have three different sections in a dual purpose plant: areas that could be used for (1) defense work, (2) peacetime production, and (3) either one.

One reason for the two-way plant is to provide quick conversion facilities. The setup would enable plants to make the switch from peace to war production on the double. They'd have the plant facilities, equipment, labor, and management all ready.

Other advantages, according to Charles E. Wilson, General Motors president, are that the plant:

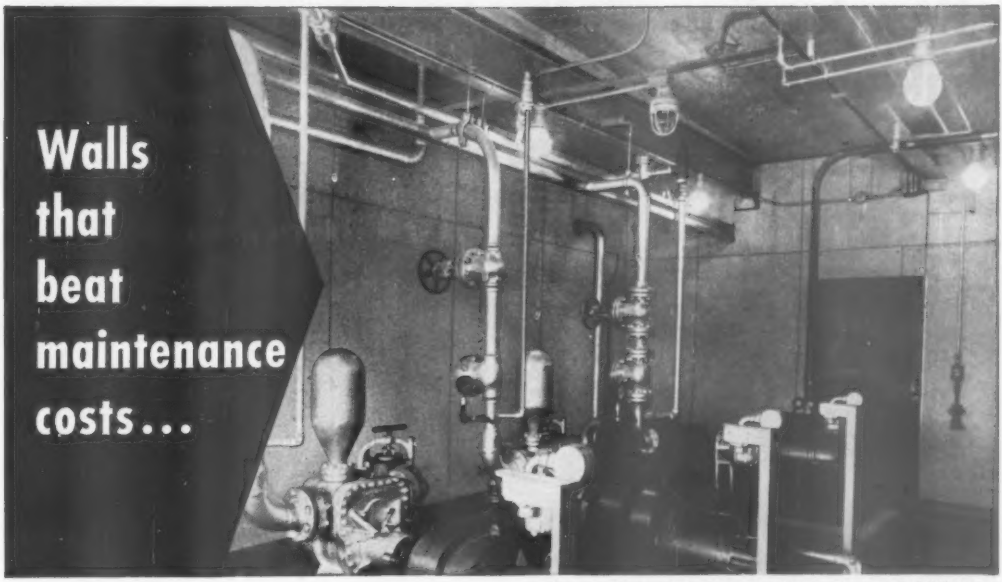
1. Eliminates need for shifting worker population.
2. Offers job security.
3. Avoids expense of building large plants planned only for defense production.
4. Avoids creating organizations whose profits depend solely on war work.

Defense Bonds Earn Flags for Plants

The Treasury Department is awarding flags to companies showing good defense bond sales records. National Tube Co. won the first one when its 27,000 employees enrolled 98.7% strong in the Government's payroll buying plan. The company's Elwood City, Pa., and Gary, Ind., plants subscribed 100%.

Cash in Your Scrap!

Turn the page



Water treatment room in large utility plant. Walls are "Century" APAC, ¾" thickness.

they're "Century"® APAC!

In the water treatment room above you see how to build walls that won't need maintenance: Use "Century" APAC—Keasbey & Mattison's versatile asbestos-cement structural sheet. APAC can fill nearly all your surface covering needs . . . interior walls and ceilings . . . exterior walls . . . on new structures and modernizations.

CONSIDER THE ADVANTAGES OF APAC:

APAC won't burn! Made of asbestos fibers and Portland cement—both inorganic—APAC will not support combustion . . . makes an excellent fire-retardant barrier!

APAC is maintenance free! It cannot rot, rust, or corrode--rodents and termites can't hurt it. APAC doesn't even need protective painting to preserve it!

APAC is easy to handle—easy to apply! Can be cut and fitted on the job—no milling or planing to bother with. Large-size sheets (standard 4′ x 8′) facilitate rapid coverage. Can be fastened with ring fettered nails or screws. Application labor costs are kept to a minimum!

You'll find "Century" APAC used today in hundreds of plants, in dozens of industries: For siding, office paneling, fire-resistant sheathing in shops and stockrooms, storage bins, linings for elevator casings, shower stalls—in fact, wherever quick, economical construction and maintenance-free service are wanted. Write us for complete information on "Century" APAC and the name of your nearest distributor.

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

Nature made Asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos®

How leading plate glass maker cut cost 5 ways by solving handling problem

EDMONT CASE NO. 209

Problem: How to prevent accidents and improve production efficiency in the manufacture of window glass, an extremely sharp-edged, slippery and fragile material handled in large sheets which must be cut and stacked by hand.

Management Solution: On-the-job tests proved that fabric gloves coated with rough-finished natural rubber on palm and thumb gave workers positive non-slip grip on sheet glass, with maximum protection against cutting injuries; also wore several times longer than other type gloves. (Company name on request.)

Count these 5 cost savings, available wherever sharp, abrasive or slippery materials are handled, with or without the presence of heat, oil, acid, caustic, solvents or degreasants:

1: Fewer lost-time accidents 2: Faster, surer work handling 3: Less spoilage 4: Improved job attitude 5: 40% to 70% saving in usual glove cost to companies or employees.

There's a correct glove for every job
Good management makes it available

To meet different service requirements — tough coatings of NEOX (specially reinforced neoprene), natural rubber or vinyl plastic, bonded to comfortable, sweat-absorbing, insulating fabric.

We offer consulting service on specific problems or complete plant surveys: (Used by Pittsburgh Plate Glass, Bethlehem Steel, Goodyear, Packard, many others.

Without cost or obligation we will gladly study your hand-protection problems and practices, make recommendations and furnish the procedures and materials for complete on-the-job tests. For full information, write our Safety Engineering Service.

Edmont Edmont Manufacturing Company
1212 Walnut Street, Coshocton, Ohio

World's largest maker of coated industrial gloves

YOU MUSTN'T MISS—

Begins on page 236

Don't Hoard Scrap! Law Says You Can't

That's right—at least for copper and aluminum. It's on the rule books of the National Production Authority. Here's part of the rule on aluminum scrap (NPA Rule No. M-22, amended Sept. 11, 1951):

Definition of Scrap Generator · Any person who in salvage, manufacture, or fabrication produces aluminum scrap.

Rule · Generator must segregate scrap by alloy, and not mix the scrap of one alloy with any other alloy or material. Any person who generates or holds any aluminum scrap shall deliver such scrap to a producer, reclaimer, smelter, fabricator, or dealer at intervals not longer than required to accumulate a minimum carload, or at intervals not exceeding 30 days, whichever occurs first.

Exception · Does not apply to skimmings, drosses, grindings, buffings, or sawings. Exception for companies which regularly use the scrap in their normal course of operations (smelters, producers, foundries, etc.)

And for copper scrap (Rule No. M-16, as amended July 13, 1951):

Definition of copper scrap · All copper or copper-base alloy materials or objects that are the waste or byproduct of industrial fabrication or which have been discarded on account of obsolescence, failure, or other reason.

Rule · No person who generates scrap in his operations, through fabrication, manufacture, or obsolescence, shall keep on hand more than 30 days' accumulation of scrap or copper-clad or copper-base alloy-clad steel scrap, unless accumulation aggregates less than 2000 pounds.

Exception · Unless specifically authorized by NPA.

Turn the page

YOU'LL GET

More Efficient Surface Grinding at Lower Cost

With this result-proved Norton combination...

● **Best In Abrasives.** There's a type of Norton ALUNDUM* or CRYSTOLON* abrasive with the exact cutting characteristics you need for fast, cool, accurate grinding and extra-long wheel life on any surface grinding job.

● **Best In Bonds.** Norton bonds for surface grinding include vitrified, silicate, and resinoid. For grinding nearly all types of steel, the famous BE vitrified bond is the favorite with grinding machine operators everywhere.

● **Manufacturing Know-How.** The precision with which Norton wheels are made is the result of 65 years of continuous research into every detail of abrasive processing — by the world's largest manufacturer of abrasives.

● **Expert Application.** See your Norton Distributor for prompt aid in selecting the *right* wheels, cylinders or segments. If your problems are unusual, he'll call in a Norton Abrasive Engineer. And remember to get your copy of the brand new Norton book, "The A.B.C. of Surface Grinding."

NORTON COMPANY
Worcester 6, Mass.
Distributors In All Principal Cities

EXPORT:
NORTON BEHR-MANNING OVERSEAS INC.
Worcester, Mass. New Rochelle, N. Y.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

With Norton Products — Applied by Norton Experts — You're Sure of Best Results!

Straight Wheels

Cylinders

Segments

NORTON ABRASIVES

Making better products to make other products better

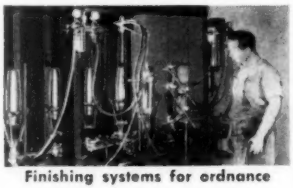
You name it...

Binks will show you how to spray paint it...

faster... better... more economically

Automotive finishing systems

Conveyorized spray systems



Finishing systems for ordnance

Aircraft finishing systems

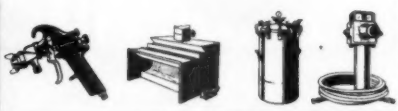
Whatever the product, chances are 100 to 1 that Binks can help you find a spray painting method that increases production, reduces rejects and lowers costs. Here's why:

During the last half-century, Binks has developed equipment to spray paint almost every product made... in war and peace. Thousands of manufacturers have capitalized on this wealth of experience. It costs you nothing to have Binks check your present methods... and you stand to gain in many ways.

SEND NOW for Bulletin 10. It lists hundreds of products painted by modern spraying processes and illustrates many unusual and outstanding installations. Tells how you can get better finishes—faster—and at lower costs. Bulletin 10 is especially valuable for those interested in defense production. No obligation.
Binks Manufacturing Company, 3114-34 West Carroll Ave., Chicago 12, Illinois.

Binks

EVERYTHING FOR SPRAY PAINTING



GUNS • SPRAY BOOTHS • MATERIAL TANKS • EXTRACTORS & ACCESSORIES

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

YOU MUSTN'T MISS—

Begins on page 236

TIMELY HINTS

How to Get—and Keep—Employees

Industrial Psychology, Inc.,Chicago, surveyed 127 companies, large and small, and came up with two ways to help you solve your personal manpower shortage. Here they are:

- Don't reject those new job applicants haphazardly. A lot of it's being done.
- Promote your "forgotten men" who have been overlooked in the past at promotion time.

"Profit Sharing Has Made Us Money..."

... says Pitney-Bowes' president, Walter H. Wheeler, Jr. His company increased productivity more than 40% since 1939; and he credits a good part of the increase to effective profit sharing.

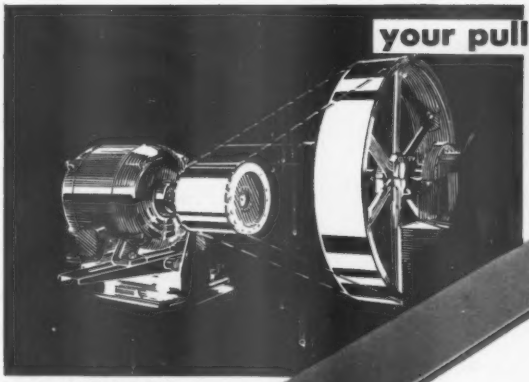
Here are some benefits of the plan, according to Wheeler:

- Increased employee participating interest increases productivity enough to offset and overbalance costs of the plan. Net income is actually raised. Thus, stockholders as well as employees earn more money.
- Employees learn more about our economic system. It's education through self-interest and participation. Employees receive dividends, and with them, quarterly letters explaining financial condition of the company.

Cash in Your Scrap!

Steel mats, ramps, and bridge plates you are no longer using are needed for scrap.

Turn the page



Graton & Knight RESEARCH leather belt on short-center controlled tension motor base drive.

your pulleys will drive your machines only as well as your belts drive your pulleys

if you want more production, get GRATON AND KNIGHT leather belting for more production-power

Get a Graton & Knight "Live Traction" Leather Belt — because it is engineered to transmit maximum uniform horsepower at correct speeds and sustained R.P.M. — with ample reserve for load peaks, and "fluid drive action" to absorb starting torque and load shocks.

For tough conditions, cross, shifter and idler drives, **HEART OAK** top grade center stock oak tannage. For short center, small pulley, cone pulley and serpentine *precision* drives, **RESEARCH®** premium quality. For ambient conditions (steam, oil, water, acid and alkali fumes) **SPARTAN®** combination tannage . . . Whatever your conditions, you'll get more production-power with Graton & Knight *Engineered* Leather Belting.

and keep your belts pulling for you

Stop belt slippage — prolong belt life with GRAKO® CLEAR Belt Dressing, result of 100 years experience in leather tanning and belt manufacture. Preserves and lubricates the fibres. Pint, quart and gallon cans — 5-gallon and 50-gallon drums. Send for circular.

New Belting Catalog and Manual shows how to get more production-power with leather belting. Our representative will deliver your (free) copy upon request. GRATON & KNIGHT COMPANY, Worcester 4, Massachusetts.

second centu G and K **engineered leather belting**

for more production-power

GRATON AND KNIGHT Estab. 1851

Twin-Highlite

• Good light quickly pays for itself in increased worker output. And Appleton Lighting Equipment is precision-built to provide your personnel with the good light necessary for maximum efficiency, high morale.

Appleton Fixtures are easy to install, easy to service. They're made to make the most of the lamp's power. Appleton reflectors distribute light evenly, without glare or troublesome fuzziness.

Plan lighting carefully for greater productivity per unit of personnel. And whatever your fixture requirements, specify Appleton, pace-setting manufacturer of electrical equipment for nearly half a century.

EFU Explosion-Proof Fluorescent
Pat. No. 2,392,202

Stocklite

APPLETON Industrial Lighting

Industrialite

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1715 Wellington Avenue • Chicago 13, Illinois

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

Branch Offices and Resident Representatives in All Principal Markets

YOU MUSTN'T MISS—

Begins on page 236

Checklist for Better Plant Health

Just how far should your industrial health setup go? The American Medical Association's Council on Industrial Health says adequate service includes:

1. Examination before worker assignments are made.
2. Health examinations periodically, especially for those who work at jobs with occupational disease hazards.
3. Treatment, as required by statutes, of occupational injuries and diseases.
4. Reasonable care and advice for off-the-job injuries and illnesses occurring on the job. Referral to employee's physician for further care.
5. Adequate health records.
6. Cooperation with management in attaining best possible health and safety conditions.
7. Program of health education for employees.
8. Coordination of plant with community health activities.

Apprenticeship Bureau Has Another Service

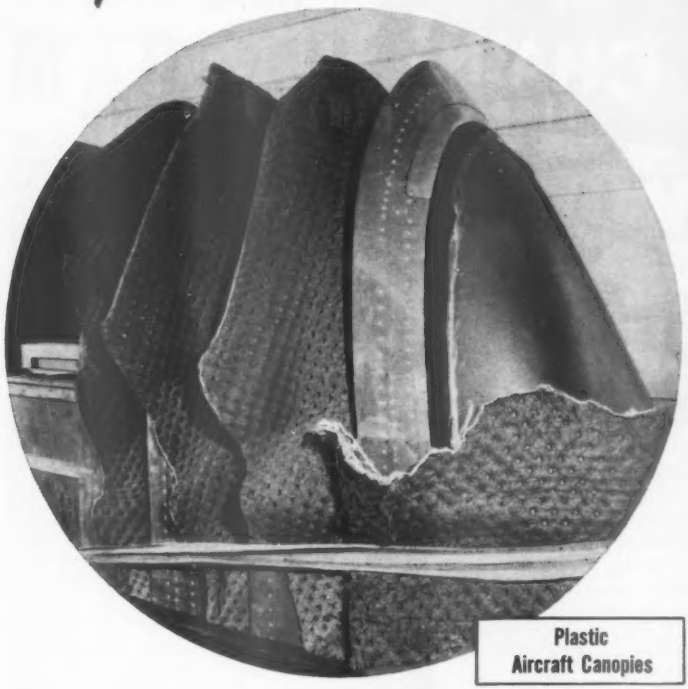
If you're having trouble getting the workers you need, maybe the Federal Bureau of Apprenticeship can help. Here's how:

1. You ask local apprenticeship agency for help. (For location, write: Bureau of Apprenticeship, Department of Labor, Washington 25, D. C.)
2. Agency learns what skills are needed and when.
3. Agency will help two ways: Guidance in setting up plant training to upgrade present employees; and aid in designing on-the-job training for new ones. This keeps workers productive while they're in training.

Cash in Your Scrap!

Turn the page

*Kimpak** Float Packaging



Plastic Aircraft Canopies

Cuts military shipping costs— reduces damage in transit!

From wartime packaging of a great range of military items—to peacetime protection of furniture, food, machinery and china! There's almost *no limit* to the type of products protected in shipment by KIMPAK* Float Packaging. But more important than its versatility is the fact that KIMPAK also provides optimum shipping protection at *lowest* true cost.

Delicate aircraft canopies for instance, are guarded against scratching and bruising; against shock, vibration and changes in humidity. Other finely machined parts are literally "floated" to their destination, free of the countless hazards of rail, truck, air or water transit—as well as storage. And soft, clean, grit-free KIMPAK is as easy to apply as wrapping paper. Its many grades and thicknesses, too—in rolls, sheets or pads—let you "tailor" the packaging operation to your particular requirements.

So regardless of your packaging problem—and especially if you are engaged in the shipment of defense materials—it will pay to investigate the better protection and economy of KIMPAK Float Packaging. For complete information, including prices, see your nearest KIMPAK distributor listed in classified telephone directories under "Packing Materials" or "Packing Materials—Shipping"; or write to Kimberly-Clark Corporation, Neenah, Wisconsin.

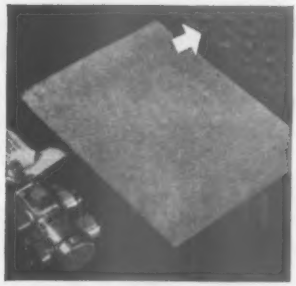
Kimpak

REG. U.S. PAT. OFF. & FOREIGN COUNTRIES

A Kimberly-Clark Cellulose Wadding Product

PROTECTIVE CUSHIONING

*T. M. REG. U. S. PAT. OFF. & FOREIGN COUNTRIES



Hydraulic Relief Valve — protected by Grade A paper, ½ inch KIMPAK Protective Cushioning, and foil-lined Kraft pouch.

Pressure Control Valve—protected by Saran moisture vapor pouch, KIMPAK, Grade A paper and Metal Edge box.

Selector Valve — protected by Saran moisture vapor pouch, KIMPAK, Grade A paper and Metal Edge box.

All photos courtesy of North American Aviation, Inc.

— TWO FREE BOOKLETS! —

KIMBERLY-CLARK CORPORATION
Neenah, Wisconsin FM-152

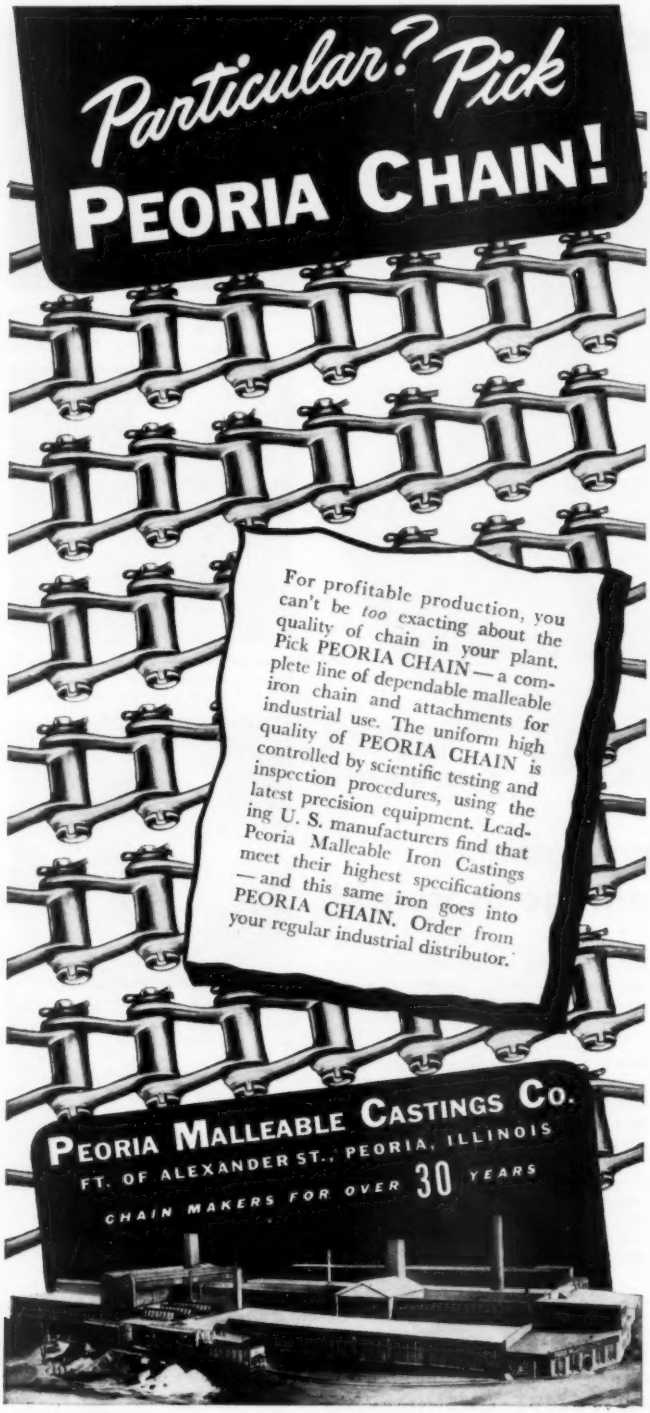
Please send me free, the following illustrated KIMPAK booklets:

- ☐ Military Packaging
- ☐ Float Packaging

Name .....

Address .....

City, Zone, State .....


Particular? Pick
PEORIA CHAIN!
For profitable production, you can't be *too* exacting about the quality of chain in your plant. Pick PEORIA CHAIN — a complete line of dependable malleable iron chain and attachments for industrial use. The uniform high quality of PEORIA CHAIN is controlled by scientific testing and inspection procedures, using the latest precision equipment. Leading U. S. manufacturers find that Peoria Malleable Iron Castings meet their highest specifications — and this same iron goes into PEORIA CHAIN. Order from your regular industrial distributor.
PEORIA MALLEABLE CASTINGS CO.
FT. OF ALEXANDER ST., PEORIA, ILLINOIS
CHAIN MAKERS FOR OVER 30 YEARS

YOU MUSTN'T MISS—

Begins on page 236

Tips for Better Suggestion Systems

Often no more than 5% of the eligible workers contribute to a company's suggestion system. So the National Assn. of Suggestion Systems recently studied ways to make cash awards and profitable suggestions pay off in a bigger way. It came up with a 4-point plan:

1. Give all suggestion boxes "eye-appeal" · Posters used on or near suggestion boxes as well as the boxes themselves should be brightly colored. Cartoons and clever slogans help a lot. Change posters frequently.

2. Make sure foremen and supervisors like the system · Studies show that departments submitting the fewest suggestions are generally headed by foremen who consider the suggestion plan a criticism of their own ability.

3. Give all suggestions prompt attention · Slow action on suggestions is a deterrent to the whole program. One NASS delegate estimated that for every 1000 employees there should be one man whose only job is to handle suggestions and report directly to the company president.

Rejected suggestions also should be acknowledged promptly, and each contributor should be encouraged and thanked for his interest. This goes for crank letters, silly suggestions, everything.

4. Publicize awards broadly · Company publications, local newspapers, bulletin boards, and company dinners all help to build enthusiasm. And a congratulatory letter from the company president is often a cherished possession long after the $25 award check has been spent.

Cash in Your Scrap!

Turn the page

NEW DEWATERING PRESS MADE POSSIBLE WITH

STERLING SPEED-TROL!

Mr. K. S. Lanker, General Manager of P & L Welding & Machine Works, Inc., Anaheim, Calif., leading manufacturers of processing equipment, states that their recently developed Dewatering Presses are powered by Sterling Speed-Trols. Sterling's fingertip control and infinite speed variation over a wide range are required for accurate control of moisture extraction by adjusting press speed to conform to the changing characteristics of the incoming product due to climate, season, holding time, etc.

STERLING SPEED-TROL GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

EQUIPMENT ADAPTATION TO: Sequence synchronization—operators' abilities—load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

PROCESS CONTROL OF: Temperature—viscosity—level—pressure—flow—etc.

TIME CONTROL OF: Baking—drying—heating—cooking—pasteurizing—soaking—chemical action—etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality and profit.

OTHER STERLING ELECTRIC POWER DRIVES:

- **STERLING SLO-SPEED (GEARED) MOTORS**
- **STERLING KLOSD AND KLOSD-TITE (NORMAL SPEED) MOTORS**

DRIP-PROOF • SPLASH-PROOF • TOTALLY ENCLOSED

70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. B-103.

OUTSTANDING FEATURES:

Infinite speeds—positive speed regulation—fingertip control—large indicator—positive pulleys—no springs—belt tension in proportion to load—protected—streamlined—Herringbone Rotor—through ventilation—versatile mounting—NEMA dimensions—shock absorbing—quiet operation—rugged—compact—dependable—long life.

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile.

Offices and distributors in all principal cities.

Oil-Dri

REG. U. S. PAT. OFF.

ABSORBENTS

Absorb all types of Oils, Greases and Fats plus Water Solutions from oil-covered floors.

EASY TO USE
Just spread it on grease spots

ECONOMICAL
Saves time, saves maintenance expense—can be used again and again

REDUCES INSURANCE PENALTIES
Recommended by insurance companies and safety organizations

Check these Advantages

1. Reduces slipping hazards
2. Reduces fire hazards
3. Improves floor conditions
4. Reduces maintenance labor costs
5. Reduces insurance penalties
6. Improves working conditions
7. Permits safer, easier, faster, walking on plant floors
8. Improves plant housekeeping

UL

IDEAL FOR
- Factories
- Machine Shops
- Service Stations
- Garages
- Grease Pits
- Repair Depts.
- Power Plants
- Elevator Pits
- Kitchens
- Food Plants
- Restaurants
- Taverns
- Breweries and many other uses.

Manufactured Exclusively by

Oil-Dri Corporation OF AMERICA
520 N. MICHIGAN AVE.
CHICAGO 11, ILLINOIS

SEE US AT BOOTH NO. 647 AT PLANT MAINTENANCE SHOW

YOU MUSTN'T MISS—

Begins on page 236

THIS SMILING FACE belongs to Herbert J. Klaes. He just got his 100th suggestion check from Ford.

One-Man Suggestion System

Herbert J. Klaes really likes suggestion systems. He's collected his 100th award check—$25 for a safety idea. The Ford Motor Co. has shelled out $1375 to the River Rouge plant electrician for his suggestions. And what's more, Ford likes it as well as Klaes does.

During the four years the Ford plan has been in effect, Klaes turned in 371 suggestions. He now submits at the rate of 12 a month; and Ford's considering 90 of them right now.

In smaller plants a suggestion every other working day from one man might create a problem. But Ford's suggestion department is equipped for men like Klaes. Since the program began in 1947, workers have submitted 78,155 suggestions. The company has paid out more than $900,000 for 17,105 awards so far. Average payment: $53.

Ford operates the plan in 75 locations. The maximum award, $1500, has been given to 73 employees. A similar program for supervisors carries no cash awards but provides commendations, which are a factor in promotion and merit pay increases.

Turn the page

"WE SAVED 48 MAN-HOURS on the 90 man-hour job of steamcleaning, rewiring and painting an overhead crane at our South San Francisco plant," says Fred Raibin, Plant Engineer, Enterprise Division, General Metals Corp.

25 ft. "UP-RIGHT" SCAFFOLD-ON-WHEELS

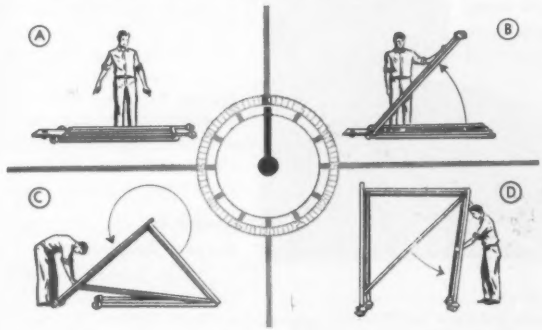
Set up in only 5 minutes!

As if by magic, an aluminum alloy tower of any height desired is ready in minutes! Individual scaffold sections are set one on top of the other. Sections lock into place instantly. The tower rolls down aisles . . . straddles machinery.

HERE'S THE SECRET!...

Patented ONE-PIECE SECTIONS

Each one-piece section is unfolded by one man in less than a minute! No tools, wing nuts or bolts.



Your maintenance costs can be reduced by "UP-RIGHT" SCAFFOLDS

WRITE FOR DESCRIPTIVE CIRCULAR

"UP-RIGHT" SCAFFOLDS

DEPT. 104 • 1013 PARDEE ST. • BERKELEY, CAL.

OFFICES IN ALL PRINCIPAL CITIES

FACTORIES: BERKELEY, CALIFORNIA & TETERBORO, NEW JERSEY

Quality features packed into every inch of this outstanding white tape:

the best **WHITE TAPE** made at the lowest price yet

Snow-white blade with bold, legible, jet-black numerals and graduations. Graduated in 32nds for first 6 inches.

Sturdy die-cast case heavily chrome-plated, calibrated for quick reading inside and outside measurements.

Blade ½" wide made of finest high carbon steel—tempered—Bonderized—enamelled—baked.

Blade replaceable in seconds—without tools—without even opening case. And Evans replacement blades cost far less.

Exclusive Evans automatic brake gives smoother push-pull action with absolutely no "creeping" of tape into case.

Underside is white too. Mark with ordinary pencil, remove mark with flick of thumb.

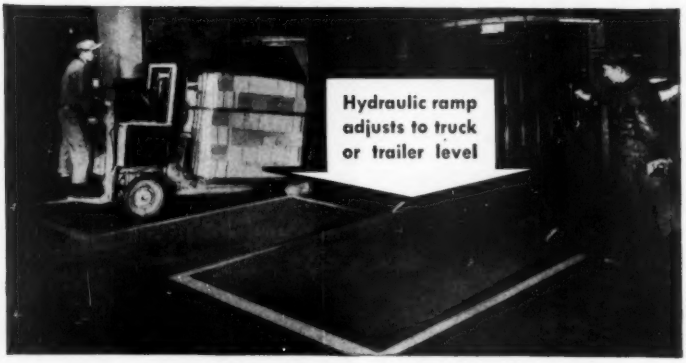
Every "Evans White-Tape" is unconditionally guaranteed.

Check these list prices:
10-ft. $1.49 8-ft. $1.19 6-ft. 98¢

7847 **Evans & CO. · ELIZABETH, N. J. MONTREAL, QUE.**
Prices higher in far west and Canada. Order from your tool distributor.

Makers of Evans Folding Rule and "The Folding Yardstick"

NEW ROTARY LEVA-DOCK
doubles loading dock capacity



Mechanize your loading dock

The new Leva-Dock travels up or down to permit loading directly into or unloading from all types of trucks or trailers . . . without using steel plates, bridge ramps or other slow and often dangerous methods.

This hinged ramp is positioned by a hydraulic jack. Retractable supporting arms and laterally adjustable throw-over bridge connect the ramp and truck bed. Platform automatically travels up or down as truck springs are compressed or relieved.

Capacities 5,000 through 20,000 lbs. Scientifically engineered, ruggedly built, powered by famous Rotary hydraulic jack. Simple to install and inexpensive to operate.

For catalog on the new Rotary Leva-Dock, write
ROTARY LIFT COMPANY, 1150 KENTUCKY, MEMPHIS 2, TENN.

YOU MUSTN'T MISS—

Begins on page 236

QUOTES

Who's to Blame for Low Productivity?

"Some criticism for lower productivity can be directed at irresponsible labor leaders who stake their futures on the 'something for nothing' approach; but industrial management can afford to do a little soul searching of its own.

"Confusion or hesitancy or industrial bureaucracy can cause a greater drop in productivity than could be offset in five years by good labor - management relations."—*W. R. G. Baker*, vice president, General Electric Corp.

Let's Sell Free Enterprise

"Free enterprise is an economic commodity that must be sold in the competitive market place. Let's face the fact that we have not advertised it as such for a long, long time.

"The American way of life is products, commodities — more things for more people at less cost. More autos, houses, TV sets, food, machinery, recreation, security, fun, and above all, more freedom to live with our own individual consciences." — *Ralph Budd*, chairman, Chicago Transit Authority.

Road to Rapid Recovery

"There is one road to rapid recovery of the nation from our present burden of rearmament. That is to increase our productive power by new technologies and new inventions." — *Herbert C. Hoover.*

Cash in Your Scrap!

Century Motors'

Unusual Freedom from Vibration Helps Maintain Close Tolerances— With a Minimum of Rejects

Century motors are designed to help you get the accuracy that was built into your modern production machines. They are ruggedly built, carefully machined and well balanced both mechanically and electrically. Century motors are widely known for their unusual freedom from vibration.

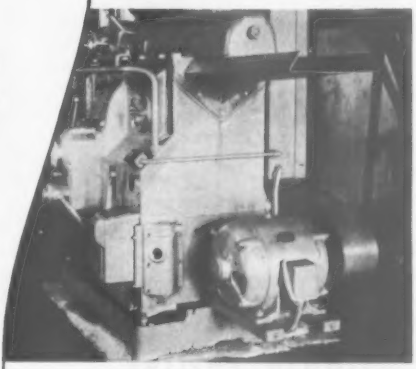
Century motors have wide acceptance from BIG NAME machine tool manufacturers because they mount squarely and solidly and operate with smooth, quiet precision.

You may select Century motors in: open drip proof — splash proof — or totally enclosed fan cooled construction to assure uninterrupted production against various atmospheric hazards.

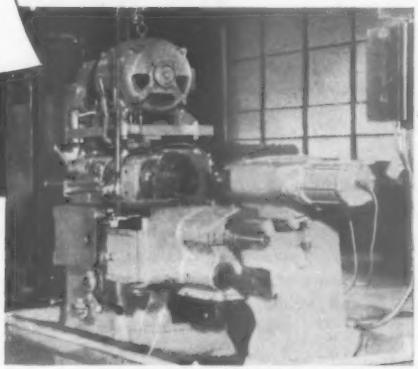
The complete line of Century motors permits selection of the right motor to meet the requirements of your machines. They are built in a wide range of sizes from 1/6 to 400 horsepower. Specify Century for all your equipment.

CENTURY ELECTRIC COMPANY
1806 Pine St., St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

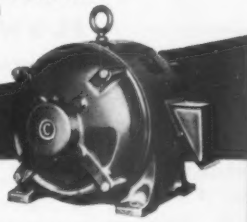
75 Horsepower Century drip proof motor on a copper tube drawing machine.



7½ Horsepower Century drip proof motor on a crank shaper in a tool room.



7½ Horsepower Century drip proof motor on a special production lathe.

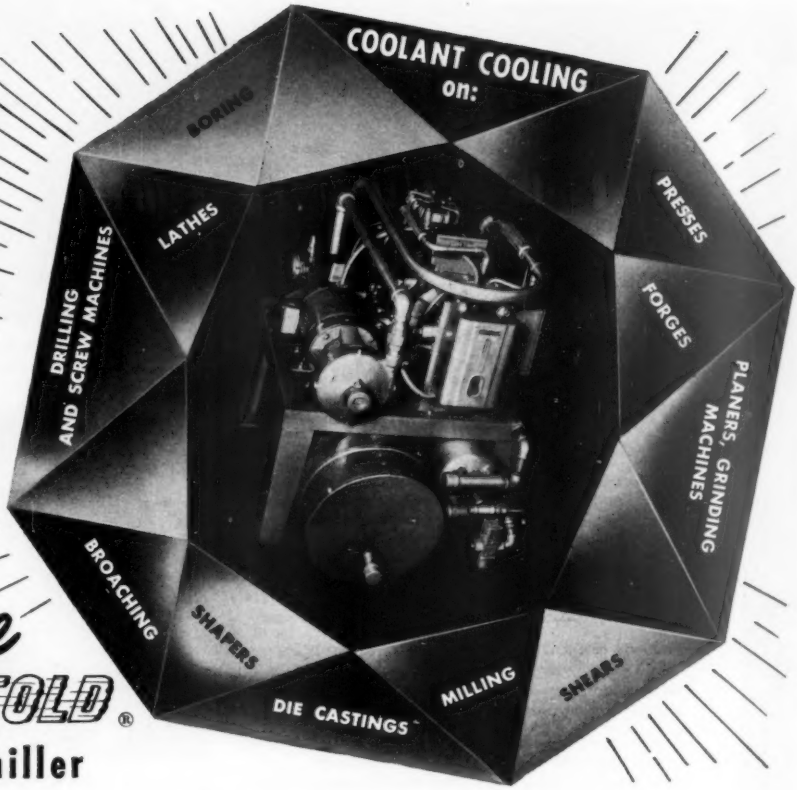


Century SERVICE
Is Near Any CENTURY Motor Driven Equipment

Prompt Service is offered by CENTURY'S National Network of more than 200 Authorized Service Stations, supervised by 28 Century Sales offices.

1. Facilities for immediate exchange of most CENTURY standard ratings of standard construction are available at CENTURY Authorized Service Stations.
2. CENTURY Authorized Service Stations are qualified and equipped to service and repair any piece of CENTURY apparatus.
3. Genuine CENTURY renewal parts are available at CENTURY Service Stations, CENTURY Parts Distributors and at the factory in St. Louis.

Century C MOTORS 700



Acme FLOW COLD® liquid chiller

. . . a "jewel" of many facets

Just as the many facets on a perfect diamond are mute testimony to the diamond cutter's skill, so are the many applications of the Flow Cold unit testimony of the skill of ACME design engineers. Wherever you need to maintain temperatures of coolants for any industrial process, the Flow Cold unit is easily adapted. Gives you exact temperature control which means uniform production quality and maintenance of closer tolerances. Can also be applied to the maintenance of solution temperatures in plating, anodizing and welding processes. Increase production quantity and quality through the use of Flow Cold. Moreover, it is the perfect chilling unit for central drinking water systems, and for home, office, or business air conditioning. Write us today!

FLOW COLD UNITS...

- ★ are self contained
- ★ are compact
- ★ are easy to install
- ★ are factory tested and assembled
- ★ are economical
- ★ are efficient
- ★ come in 6 models — 2 to 15 H. P.

ACME also manufactures:

Dry-Ex* Water Chillers, Hi Peak* Water Coolers, evaporative condensers, shell and coil and shell and tube condensers, fin coils, cooling towers, oil separators, liquid receivers, heat exchangers. Write us today for any information you desire about the Flow Cold unit, or about any of the other articles we manufacture.

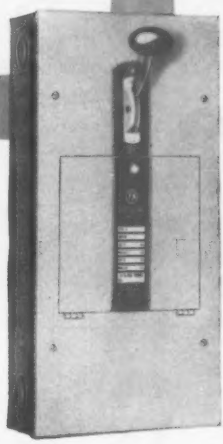
*Trade Mark

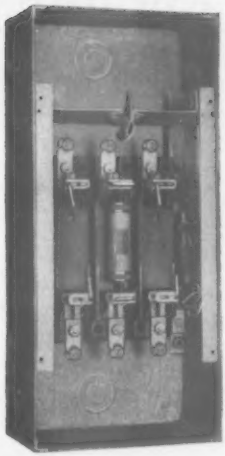
ACME INDUSTRIES, INC., 750 Mechanic St., Jackson, Mich.

Flow Cold Division

CONTINUOUSLY SERVING THE AIR CONDITIONING AND REFRIGERATION INDUSTRY SINCE 1919

Here's a Switch that thrives on WORK!





Ample wiring space at top, bottom and rear, plus a removable switch unit speed installation.

SHUTLBRAK

Type A

ENCLOSED SWITCHES

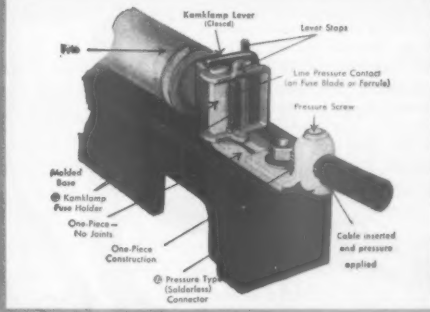
Ⓕ **Type A Shutlbrak Switches** are an answer to industry's need for a high quality, long lasting, trouble-free heavy duty switch.

Featuring quick make and break operation, these safe, dependable switches have inter-locking fuse doors which automatically lock when the current is "on" and permit access when the switch is "off" (An intermediate position of operating handle provides access only by authorized persons.)

Underwriter Laboratories-approved, Ⓕ Type A Shutlbrak Switches are ideal for motor control, service entrance or for any job requiring a heavy operating switch. They can be effectively used also for panelboard and switchboard assemblies.

Capacities are 30 to 1200 amps, 250 volts AC or DC and 575 volts AC in 2, 3 and 4 poles. For further information contact your nearest Ⓕ representative or write for bulletin 501.

Ⓕ **Type A Shutlbrak Switches** provide split-second speed of operation with a new shuttle mechanism and heavily silvered copper contacts that roll under pressure and actually improve with use.



KAMKLAMP FUSEHOLDERS have silver plated pressure type contacts to reduce heating and eliminates the need for auxiliary means of obtaining pressure between fuse terminals and fuseholder. Solderless type pressure connectors are another feature.

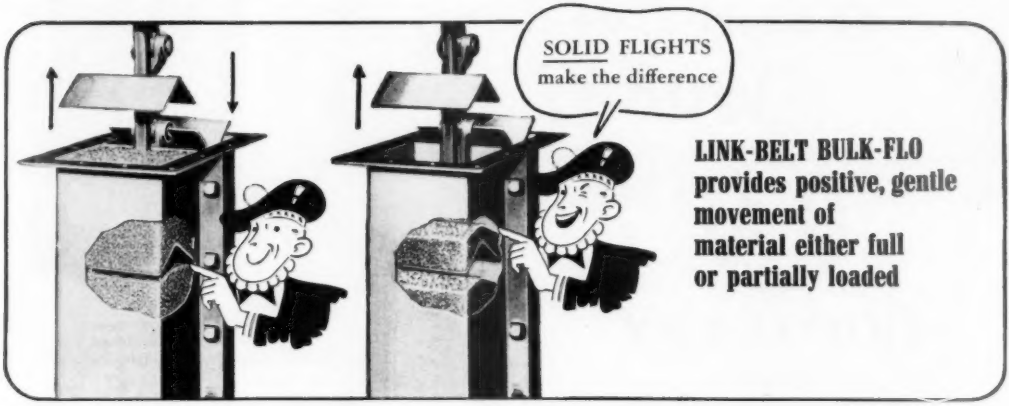
Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 13, MISSOURI

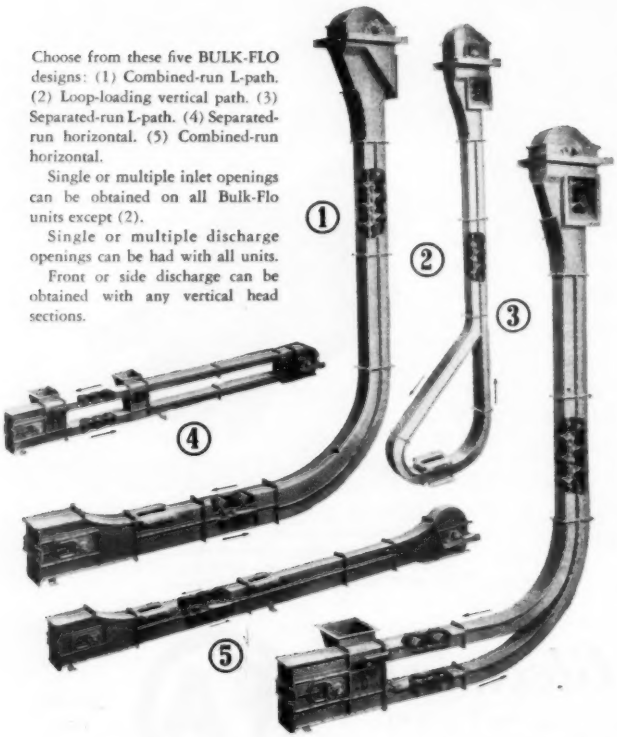
Our 61st Year

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

Combined feeder · conveyor · elevator cuts your handling costs



LINK-BELT BULK-FLO provides positive, gentle movement of material either full or partially loaded



Choose from these five BULK-FLO designs: (1) Combined-run L-path. (2) Loop-loading vertical path. (3) Separated-run L-path. (4) Separated-run horizontal. (5) Combined-run horizontal.

Single or multiple inlet openings can be obtained on all Bulk-Flo units except (2).

Single or multiple discharge openings can be had with all units.

Front or side discharge can be obtained with any vertical head sections.

BULK-FLO gives you true versatility in bulk materials handling . . . at lower cost. It replaces several units in less space . . . cuts initial outlay. And because *solid flights* operate independently of internal pressure, BULK-FLO can be operated at less than full capacity, with positive movement of materials.

That means capacity can be varied by regulating the feed. It also means gentler handling —material is protected in individual "compartments" to minimize degradation.

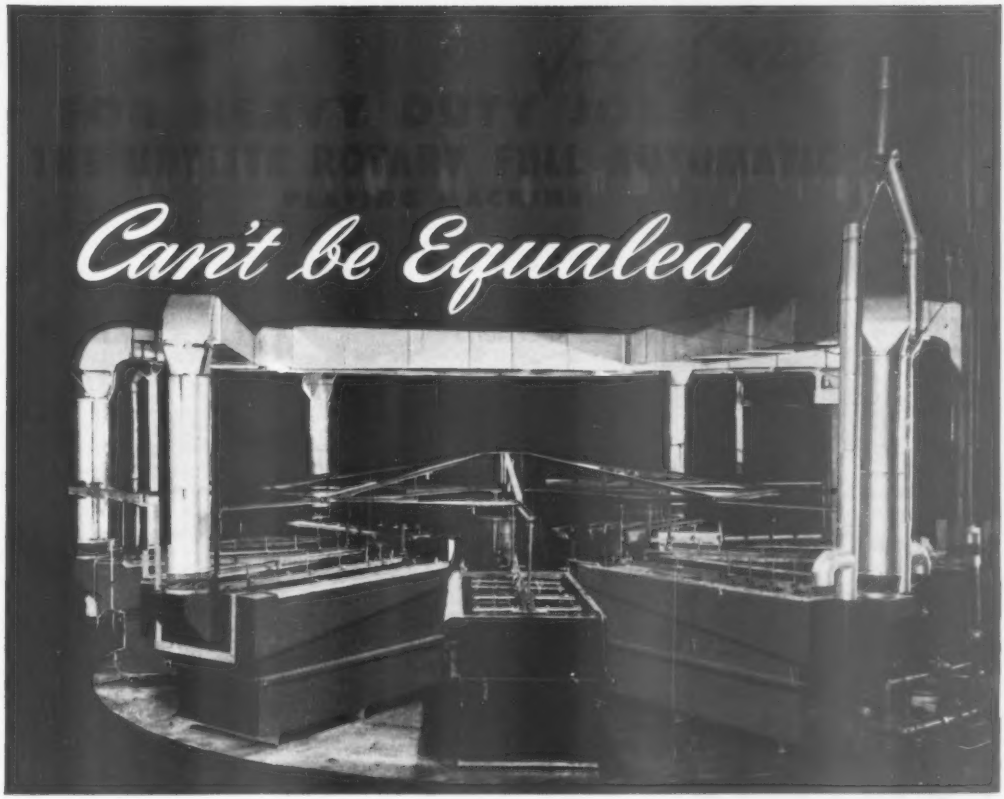
And note this—regardless of the amount of material being fed, BULK-FLO is self-clearing through intermediate runs. This feature allows you to alternate batches of different materials and prevents contamination.

You can get complete information on BULK-FLO from the Link-Belt office near you. Or write for your copy of Book 2175.

LINK-BELT

BULK-FLO
FEEDERS - CONVEYORS - ELEVATORS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Offices in Principal Cities. 12,662

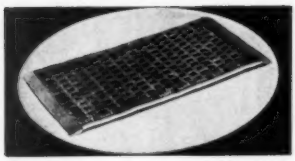


Here's the heavyweight champ of the metal finishing field—designed especially for those tough defense jobs—Udylite's Rotary Full Automatic. The tremendous power and flexibility of its hydraulic drive make a simple matter of processing work pieces of any size or shape. It's ideal for pickling and bonderizing shell and rocket casings—for etching stainless steel jet engine rotors—anodizing aluminum aircraft parts. It can handle any metal finishing operation vital to building the sinews of defense.

Mechanically simple, the Udylite Rotary is constructed in the shape of a cartwheel. The tanks may be arranged radially around the lift shaft like the spokes of a wheel or placed end to end like a wheel's rim. Either arrangement allows easy access to the tanks for servicing the solution. This machine is very easy to install—it is shipped ready to run. Since it has few moving parts, maintenance is held to a minimum. If you have a large volume of heavy parts production, it will pay you to ask your Udylite Technical Man about the Rotary Full Automatic for plating and other metal finishing processes. Or, if you prefer, write to us direct for full information. There's no obligation.

PIONEER OF A BETTER WAY IN PLATING

THE Udylite CORPORATION
DETROIT 11, MICHIGAN



PREVENT SLIPPING

AND ACCIDENTS

RETARD FATIGUE

REDUCE BREAKAGE

with

TUF-TRED

SAFETY MATTING

A low-priced, superior grade of rubber fabric matting and the only one equipped with non-trip beveled safety nosing on the ends. Links strongly laced on galvanized rust-resisting steel wire, reinforced by metal plates. Thickness: ⅝". Width: Up to 6 feet. Any length.

AMERICAN MAT CORP.

1745 Adams Street Toledo 2, Ohio

( ) Please send literature and prices on Tuf-Tred Safety Matting.

Name .....

Firm .....

Street .....

City & State .....

IN CANADA

American Mat Corp. Ltd., Canada Trust Building, Windsor, Ontario.

Test Your Reading Ability

Answer the 10 questions below *after* you have read "How to Get the Most Out of Dollars Available for New Equipment," on page 106. Then turn to page 264 for the correct answers, and for details on how to score yourself and interpret your score.

QUESTIONS

• Test questions and scoring key prepared by A. B. Herr, The Reading Institute, New York University.

1 • What is the main topic of this article?

——a) structure of the Glenn L. Martin Facilities Control Board, ——b) plan for the maximum utilization of industrial equipment, ——c) plan for semi-annual forecasts of capital expenditures, ——d) control plan for investment in new equipment

2 • The writer claims that an organized method of making decisions concerning the purchase of equipment:

——a) guarantees most modern equipment for every process in the shortest possible time, ——b) saves hundreds of thousands of dollars and promotes effective use of all available equipment, ——c) helps to hold capital expenditures strictly within budget limits, ——d) saves money but frequently forces sub-contracting

3 • The chief function of the Facilities Control Board is to:

——a) increase production, ——b) keep management posted on research, introduce improved equipment or processes, ——c) supplement the budgetary considerations because the budget is only a forecast, ——d) reduce excessive maintenance costs

4 • The Facilities Control Board includes:

——a) chief executives of all plant divisions, ——b) vice president in charge of manufacturing, assistant general manager, controller, heads of some operating departments, ——c) president of the company, ——d) foremen only

5 • When a need or desire for new capital equipment is expressed it may lead to:

——a) purchase of the equipment requested, ——b) change in existing equipment or methods, ——c) sub-contracting, ——d) all three of these

6 • One of the first steps in investigating whether it would be advisable to buy new equipment is to:

——a) see if discount could be obtained if a sizable order is placed, ——b) have a meeting with heads of departments, ——c) try to find a way which would get a higher production rate out of equipment now in use, ——d) speed up the workers

7 • If maintenance costs on equipment get too high, this procedure is followed:

——a) A group of machines is immediately replaced, ——b) a group of machines is repaired, ——c) a check is made of the file of job-cards for the machine causing the trouble, ——d) more modern machines are recommended

Turn the page

Only GUMMED TAPE gives you a really DIRT-PROOF CARTON

If you want to keep foreign matter out of your shipments, you must do more than simply close the carton. You must *seal* it...so completely that not even a crack remains. Gummed sealing tape is the only closure that gives you this protection.

Gummed tape covers over the exposed seams and corners, fusing its tough, protective kraft to the body of your carton. Openings are not left for smoke, dust, or moisture to penetrate. Odors are sealed out. Vermin are excluded. Use gummed tape closures, and you can be sure your merchandise arrives in the same spotless condition you packed it.

Orange Core makes your shipping dollars go further

ORANGE CORE IS *Supple-ized** for better sealing

Supple-izing **is an exclusive Hudson process to make Orange Core tape more flexible, and to prevent curl. *Supple-ized* Orange Core conforms freely to the contours of your carton—gives a better closure. Your workers can apply the treated tape with greater speed, too. Test Orange Core for a month in your own shipping room, and see the difference.**

ORANGE CORE
Copyr. H. P. & P. Corp.
GUMMED SEALING TAPE

Available plain or printed, in choice of widths, weights, lengths and colors.

*copyrighted

HUDSON PULP & PAPER CORPORATION • Dept. 48 • 505 Park Avenue • New York 22, New York

You can't jam the new RIDGID 65R

Really streamlined pipe threading with this RIDGID self-contained die stock

Right Here **is the simple device that makes 65R automatically *JAM-PROOF.***

● You don't have to watch it—lead screw can't jam on workholder. New jam-proof drive plate automatically kicks out driving ratchet pawl when standard length thread is cut. Your recent model 65R easily converted—just buy new drive plate, put in place of old plate. Perfect threads on 1″ to 2″ pipe with one set of 4 high-speed steel dies—sets to pipe size in 10 seconds, mistake-proof self-centering workholder sets instantly! Buy the new jam-proof RIDGID 65R at your Supply House.

RIDGID

★ Work-Saver Pipe Tools ★

READING TEST . . .

Begins on page 260

8 · The most critical step in the process is:
——a) checking with the supervisor to find which machine is causing trouble, ——b) finding out which workmen are most skillful in operating the machine, ——c) finding out how much new equipment would cost, —d) working up an estimate of savings based on all facts and figures gathered in regard to proposed capital expenditures

9 · The control plan requires that new equipment pay for itself within:
——a) 1½ months, ——b) a fixed period of "X" months, ——c) a period acceptable to the board upon several pertinent considerations, ——d) 15 years

10 · Savings claimed for new equipment installed:
——a) can be automatically deducted from operating cost budgets immediately upon installation, ——b) can be deducted from operating budgets when supervision verifies savings, ——c) can be taken into account in the next semi-annual budget, ——d) may affect profits but never affect budgets

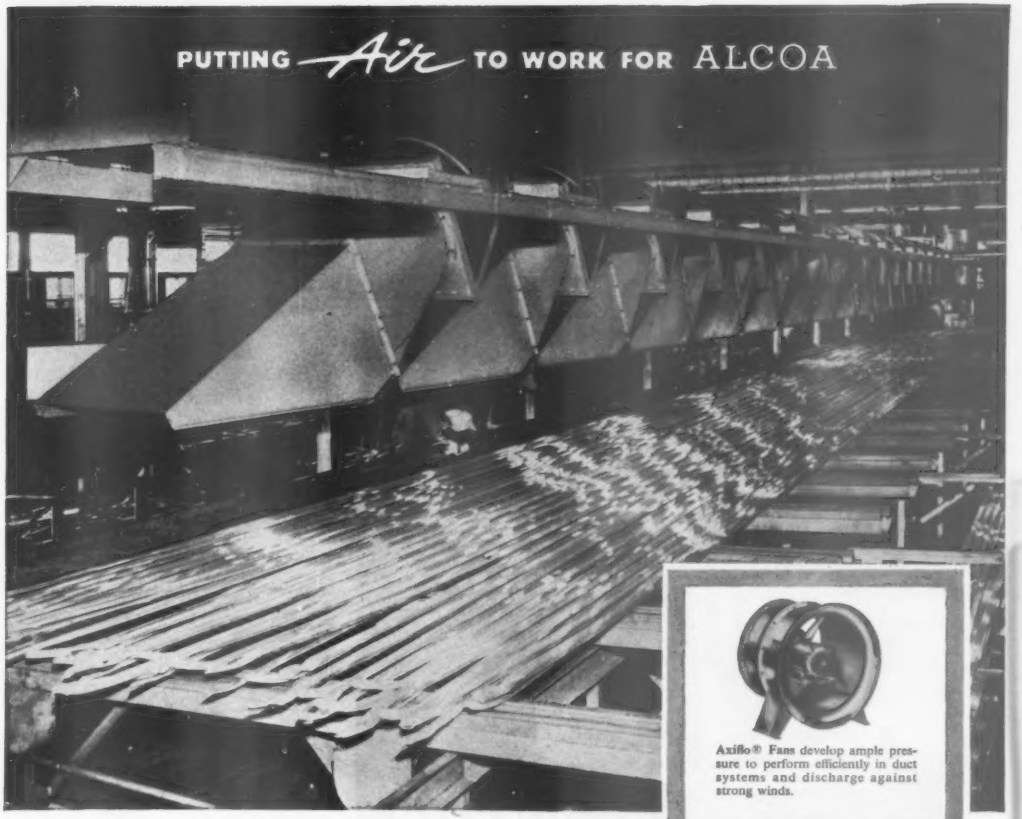
SCORING INSTRUCTIONS

Be sure to figure all three of your scores: comprehension, speed, and reading index. For a full explanation of these scores, as well as information on how to improve your scores, see "How to Read Better and Faster," on page 84 of FACTORY's October 1951 issue. If you've passed your copy along to someone else, write The Editor for a reprint.

Comprehension score: Just add up the percentage credits for each of the questions you answered correctly.

Speed score: Refer to your note of how long it took you to read the article. Convert the time into seconds. Divide the result by 10. This answer you divide into 1550

Turn the page



BIG BREEZE

SOAKS UP 300° IN A HURRY

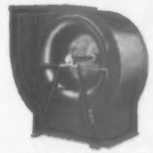
These 100-foot strips of structural aluminum are getting an air bath that sponges off 300° F. . . . but fast. A concentrated blast of air quenches the hot shapes leaving the forming mold . . . cools continuously for over 100 feet as they move down the line.

Mounted overhead are 17 Sturtevant Axial Flow Fans, delivering quenching air that helps maintain mechanical properties in the aluminum through quick, even cooling. These large capacity fans supply a steady stream of cooling air at high efficiency. Result: a uniform product for ALCOA.

There's Westinghouse equipment ready to help you *put air to work* too . . . whether it's with air handling, air conditioning, or electronic air cleaning. Call your local Westinghouse-Sturtevant office for full details, or write Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

Axiflo® Fans develop ample pressure to perform efficiently in duct systems and discharge against strong winds.

In Elbow Axiflo Fans, motors, belts and bearings are located outside the air stream, an advantage in handling corrosive fumes.



Silentvane® Centrifugal General Purpose Fans move air efficiently and quietly for many industrial and commercial applications.

YOU CAN BE SURE...IF IT'S

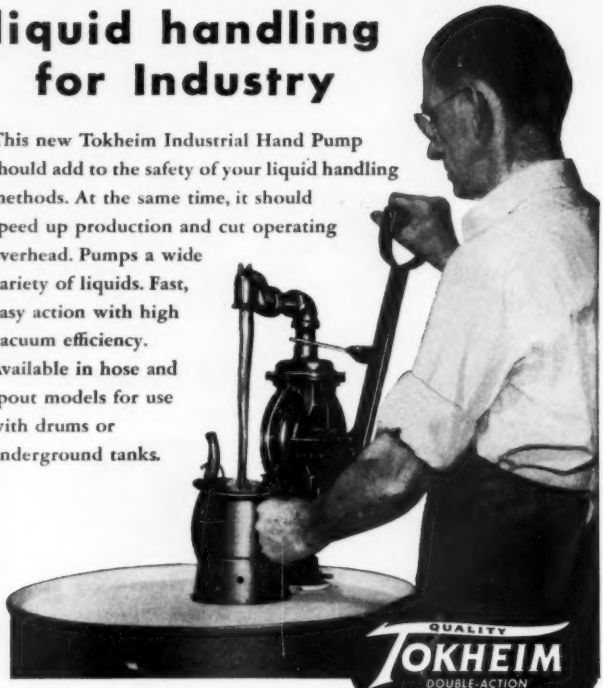
Westinghouse

J-80226

SAFER

liquid handling for Industry

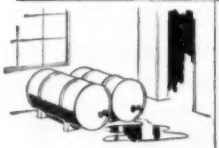
This new Tokheim Industrial Hand Pump should add to the safety of your liquid handling methods. At the same time, it should speed up production and cut operating overhead. Pumps a wide variety of liquids. Fast, easy action with high vacuum efficiency. Available in hose and spout models for use with drums or underground tanks.



NO WASTEFUL DRIPPING
Special nozzle attachment eliminates dripping.

REDUCE FIRE HAZARD
Spilling of liquids is greatly minimized.

Pump is approved for use with petroleum liquids.



NO SLIPPERY FLOORS
Liquids don't reach floor to cause accidents.

SAVE SPACE
Drums may be stored or used in upright position.

SPEED PRODUCTION
Liquids are pumped from drums at any desired speed.

Write for literature and detailed information.

General Products Division
TOKHEIM OIL TANK AND PUMP COMPANY
1652 Wabash Avenue, Fort Wayne 1, Indiana
Factory Branch: 1309 Howard Street, San Francisco 3, California

READING TEST . . .

Begins on page 260

(number of words in the article.) Finally, multiply this last result by 6. This will give you your reading speed in words per minute. (If you recorded your time in decimal minutes, you can get the result directly by dividing the time into 1550.)

Example: It took you 4½ minutes to read this article. That's 270 seconds. Divide 270 by 10, and you get 27. Divide 27 into 1550. Result is 57.4. Multiply this by 6. Your reading speed is 344 words per minute. (Or divide 4.5 into 1550 and get 344 words per minute.)

Reading index: To find your reading index, multiply your speed in words per minute by your percentage comprehension and divide by 100. Do not figure reading index if your comprehension score is less than 75%. With lower comprehension, the reading index is not valid.

Example: If your speed was 344 words per minute and your comprehension 90%, your index would be:

$$\frac{344 \times 90}{100} = \frac{30960}{100} = 310$$

Now check yourself against this table of reading indexes: 400 or more (excellent); 300-399 (very good); 250-299 (fair); 200-249 (average), 150-199 (poor); below 150 (very poor).

This table of reading indexes is approximate only. It consists of estimates by experts at the Reading Institute, but has not been tested on a large group to establish accurate ranges. We'd be interested to hear how you made out, so we can check our estimates. A post card will do. Sign it or not, as you wish.—THE EDITOR

Answers to test questions

Q	A	Credit	Q	A	Credit
1	d	20%	6	c	5%
2	b	10	7	c	15
3	c	15	8	d	5
4	b	5	9	c	5
5	d	10	10	a	10

Tape it with Behr-cat*

Scrap your steel strap. . . . Here's the new way to simplify your packing and shipping. It's BEHR-CAT Strapping Tape — the new sinewy-strong, filament-reinforced tape that goes on fast — sticks by touch — and holds with a vise-like grip. Give this tape the toughest test, wherever and however you ship. . . . Its light weight makes it especially suitable for air freight, and saves poundage in regular shipping. And its easy handling makes it a favorite in fast-moving shipping departments everywhere. Use economical BEHR-CAT Strapping Tape for sealing cartons, wrapping coils of wire, tubes, plate glass and banding metal parts, etc. Order a supply from your distributor or write direct.

YOUR SPECIAL TAPE PROBLEM

is welcomed at BEHR-MANNING. Our fully staffed laboratories are completely at your service. Put us to the test. Write us today. Address Dept. FM-1.

*Trade Mark

BEHR-MANNING
CORPORATION
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

Main Office and Plant, Troy, N. Y., U. S. A.
For Export:
NORTON BEHR-MANNING OVERSEAS INC.

Give 'em the BUM'S RUSH!

Don't let Dirt, Dust, and Grit spoil the working efficiency of your machinery and equipment. Rush 'em out of every crack and crevice with a CLEMENTS - CADILLAC blower-suction cleaner. Easy to use, economical. Ask your mill supply dealer.

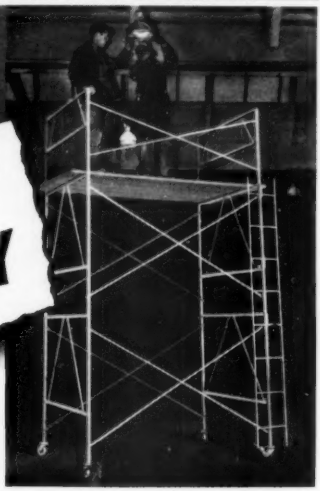
Eligible under C.M.P. regulations.

CLEMENTS MFG. CO. 6634 S. NARRAGANSETT AVE., CHICAGO 38, ILL.

ASK YOUR MILL SUPPLY DEALER OR WRITE US FOR DATA

NO MONEY CAN BUY...

A BETTER SCAFFOLDING THAN SAFWAY



Large and small industrial plants find many profitable applications for Safway tubular steel scaffolding . . . both outside and indoors. Standard interchangeable parts are quickly assembled to any form required for uses such as:

SCAFFOLDING (for building maintenance), STATIONARY TOWERS (for stock inspection and work), ROLLING TOWERS (for equipment maintenance), PLATFORMS (for assembly of large machines), RACKS (for storage of stock), etc.

Assemblies may be permanent or temporary. Safway parts can be re-used indenitely

Write for Catalog FM152.

SAFWAY STEEL PRODUCTS INCORPORATED 6339 West State St. MILWAUKEE 13, WIS.

Manufacturers of Tubular Steel Scaffolding and Equipment

NEW MATERIALS

RENOVAIR removes offensive plant atmospheres by killing the odors in the air, not by deadening the sense of smell. It's primarily an industrial deodorizer, designed for easy installation in existing air conditioning systems, according to Boyle-Midway Inc., 22 E. 40th St., New York.

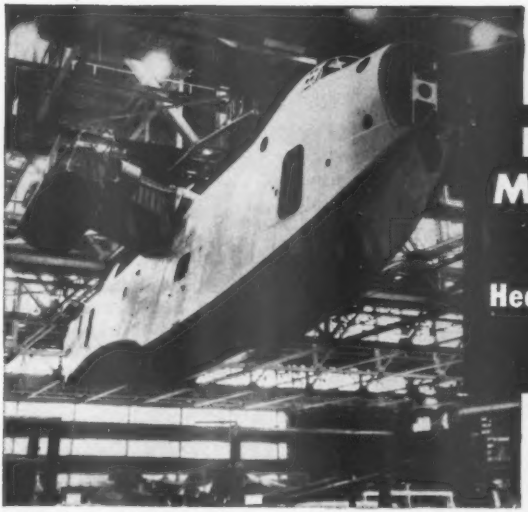
POLISHING AGENT and applicator are rolled into one in Rollies, according to Embree Mfg. Co., 10 W. Mravlag Place, Elizabeth 4, N. J. Rollies are basically cotton tissue rolls impregnated with any one of a wide variety of polishing, buffing, or oiling compounds. They are ready to use as is.

HIGH-HEAT INSULATION that's extra thin has been developed by Irvington Varnish & Insulator Co., Irvington 11, N. J. Silicone Novabestos is only 0.003 inch thick, but can be used on electrical equipment with operating temperatures up to 180 C. That's in the same category as Class "H" insulation. The new insulation is 97% pure asbestos, 3% organic material.

CELLULINER, a protective cushioning material, is four times as resilient as the usual creped wadding, according to Gilman Bros. Co., Gilman, Conn. Celluliner comes either highly absorbent, or highly water-repellent. Special treatment makes it flameproof and mildewproof. It's said to have good heat insulation, too. Available in rolls and sheets.

FERROLUM AND CUPRALUM — lead-clad steel and copper respectively —can't be eaten away by sulphuric acid. Ferrolum has steel's strength, Cupralum has copper's conductivity. But both are protected from corrosion by a bonded coating of lead. Knapp Mills, Inc., 23-15 Borden Ave., Long Island City, N. Y.

Turn the page



Designed and built by The Glenn L. Martin Co. for destruction of enemy denizens of the deep, this P-5M-1 Marlin anti-submarine seaplane is one of many being readied for use by the U. S. Navy.

Prominent Aircraft Manufacturer Selects COOLITE Heat Absorbing and Glare Reducing GLASS

Over 90,000 sq. feet Glazed in Three Exposures in Glenn L. Martin Buildings

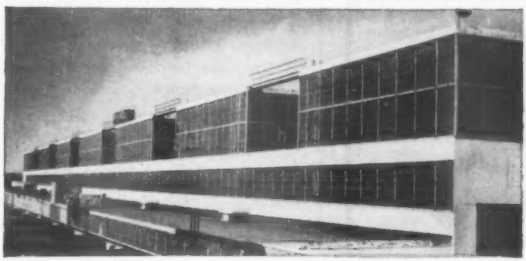
Appreciation of the vital role played by regulated daylighting in keeping production at high level prompted management of The Glenn L. Martin Company to explore thoroughly the advantages of heat absorbing and glare reducing glass for its huge plant in Baltimore, Md.

Following conclusive tests, Coolite was specified in "B" and "C" buildings where it has since demonstrated its ability to control sunlight and solar heat to meet exacting requirements.

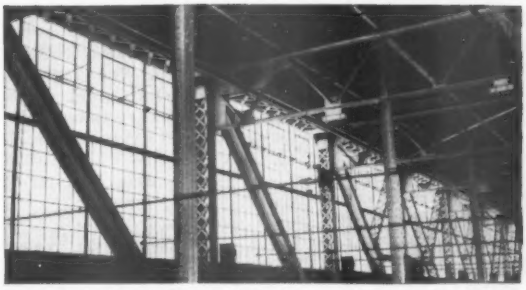
According to Martin Company executives, Coolite, Heat Absorbing and Glare Reducing Glass admits maximum natural light while excluding blinding sun rays that cause eye fatigue and lead to inefficiency and production declines.

In buildings glazed with Coolite, glare reduced, there have been no complaints from workers due to sunlight glare. Yet on bright days electric lights can be completely shut off in the final assembly areas. As a result, the company considers Coolite glass indispensable in all the south, west and east exposures of its buildings.

Like many others you too may find that whether used in new construction or modernization, Coolite, Heat Absorbing and Glare Reducing Glass can provide increased efficiency and economy. For details, see your nearby Mississippi Glass distributor.



West elevation of The Glenn L. Martin Co's "B" building glazed with Coolite, Heat Absorbing and Glare Reducing Glass.



Interior view of Coolite in a southern exposure. Note even distribution of soft, comfortable daylight.

Rolled, Figured and Wired Glass by Mississippi is *"Visioneered"* for better daylight illumination. Available in a variety of patterns and surface finishes, all scientifically designed to distribute light to best advantage.

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

Send for free catalog, "Coolite Heat Absorbing and Glare Reducing Glass."

Samples on request.

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

T-J SETS RIVETS and CLINCH NUTS Faster!

T-J CLINCHOR ... shown here is one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. These Clinchors feed and set 11/16" square cased nuts in outside quarter panels, left and right hand.

TWIN RIVITOR used for riveting flat steel springs to mounting brackets for automobile horns.

●

T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.

Set clinch nuts 3 to 5 times faster with a T-J Clinchor! Fully automatic ... controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

For *high production* ... T-J Rivitors! Automatically feed and set solid rivets. Set 1/16" to 1/4" diam. solid steel rivets up to 7/8" long using *electrically powered* Rivitor ... aluminum alloy rivets up to 1/4" diam. or steel rivets up to 1/8" diam. and up to 3/4" long, using *air powered* Rivitor. Throat depths, 8" to 36".

Speed up assembly in aircraft, farm machinery, automotive, stampings of all kinds ... with T-J dependability! Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Company, Jackson, Michigan.

35 Years Experience

T-J TOMKINS-JOHNSON

RIVITORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS, CLINCHORS

NEW MATERIALS

Begins on page 266

"44" RESIN SOLDER has one outstanding virtue — speed. This solder melts, wets the metal, and spreads so fast you can't follow the separate actions, claims the Kester Solder Co., 4201 Wrightwood Ave., Chicago 39. Resin "44" is non-corrosive, electrically non-conductive, and conforms to ANA specs.

ENAMELING PROCESS developed by Strong Mfg. Co., Sebring, Ohio, looks good for three reasons: You can use it on non-premium steels, you need only one coating, and you apply it directly to the metal without bonding agents. Finished enamel can be drilled or punched without chipping.

MOLDING PLASTIC—called Plaskon Reinforced Alkyd—is the first of its kind to be molded at high production speeds by conventional methods, according to Libbey-Owens-Ford Glass Co., Nicholas Bldg., Toledo, Ohio. The new plastic has higher impact strength than any other plastic material.

PLYRON is a new building material made by facing plywood with hardwood. The resulting panel is puncture-proof, rigid, and dimensionally stable, also splitproof and light in weight, says the Douglas Fir Plywood Assn., Tacoma Bldg., Tacoma 2, Wash.

PLASTIC-ARMORED METAL TUBING is made in a variety of forms by Samuel Moore & Co., Mantua, Ohio. You can get it in round, square, triangular, oval, and streamlined shapes, in a wide range of sizes, colors, and finishes. The vinyl or polyethylene coating won't chip or flake, says the maker. It's corrosion resistant, and free from static electric shock.

IF YOU HAVE FLUID LINES TO CONNECT

YOU'LL SAVE TIME AND TROUBLE WITH

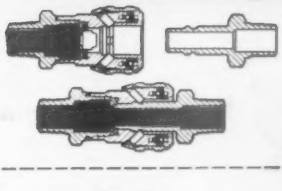
HANSEN

QUICK • CONNECTIVE COUPLINGS

HANSEN PUSH-TITE COUPLING

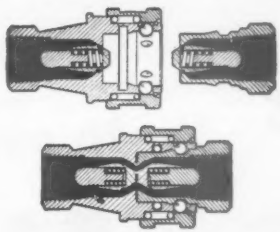
Shuts off one side of line

Gives quick connection and disconnection, with instant automatic flow or shut-off. To connect coupling, and open line to flow of fluid, merely push plug into socket. To disconnect, a slight pull on sleeve releases plug and shuts off supply end of line.



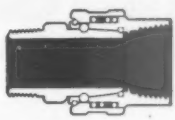
HANSEN HIGH PRESSURE TWO-WAY SHUT-OFF COUPLING

To connect, pull back sleeve and push plug into socket. Identical torpedo type valves permit free flow of gas or liquid through coupling. To disconnect, pull back sleeve..coupling immediately disconnects, valves automatically seal both ends of line. Can be mounted to disconnect automatically where fluid lines may be subject to sudden, damaging strain.



HANSEN STRAIGHT-THROUGH COUPLING

Provides quick connection and disconnection, but does not have shut-off feature. Size range for general use from ¼" to 2½". Two special types of straight-through steam couplings also available—one for low pressures, and one for high pressures.



QUICK-CONNECTIVE FLUID LINE COUPLINGS

for

AIR • OIL • WATER • STEAM • VACUUM
OXYGEN • ACETYLENE • GASOLINE
GREASE • COOLANTS • REFRIGERANTS
HYDRAULIC FLUIDS

Since 1915

REPRESENTATIVES

BALTIMORE
BIRMINGHAM
CHICAGO
CLEVELAND
DALLAS
DAYTON
DENVER
DETROIT
FT. WAYNE
HARTFORD
LOS ANGELES
LOUISVILLE
MILWAUKEE
MINNEAPOLIS
NEW ORLEANS
PITTSBURGH
ROCHESTER
SAN FRANCISCO
SAVANNAH
SEATTLE
ST. LOUIS
MONTREAL
TORONTO
VANCOUVER

Export Department: CLEVELAND

Write for catalog giving complete range of types and sizes of Hansen Quick-Connective Couplings

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

TIME Saving

with 842 sizes... of completely machined and finished Bunting Bronze Bearings for applications in machine tools and industrial machinery of all kinds.

with 316 sizes... of Bunting Bronze Bearings for all makes and sizes of electric motors. Completely finished, ready for installation.

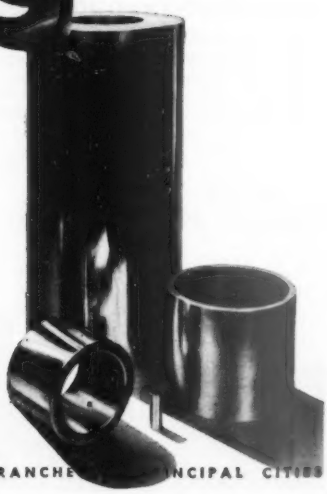
with 256 sizes... of Bunting Precision Bronze Bars fully machined I.D., O.D. and ends.

Bunting®

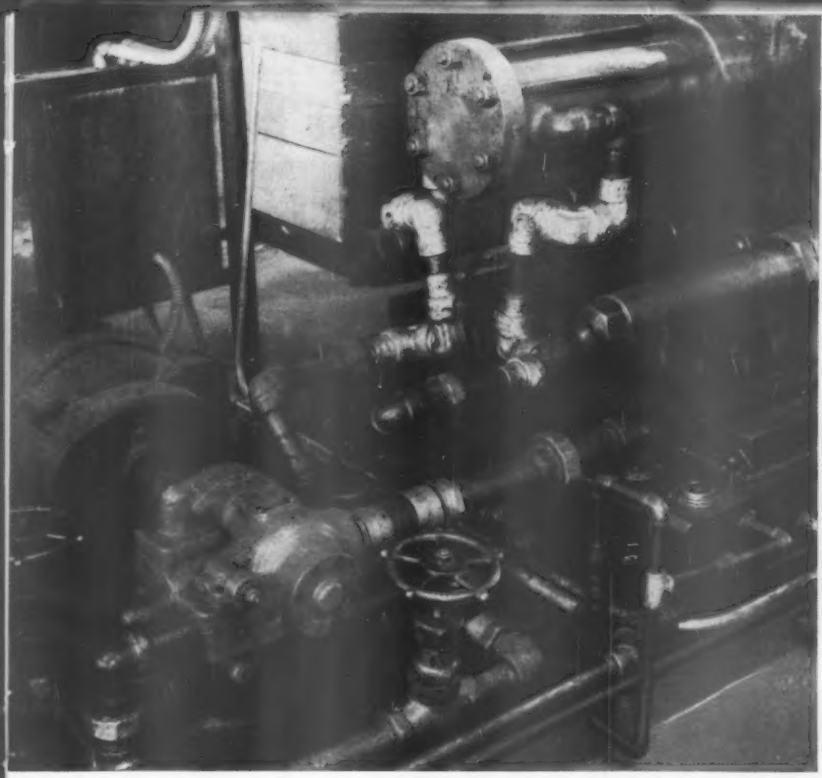
BRONZE BEARINGS • PRECISION BRONZE BARS • BUSHINGS

...IN STOCK EVERYWHERE

Bunting products are instantly available in all markets, from the stocks of leading industrial distributors and distributors of specialized industrial items. Ask your distributor or write for catalog.



THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 9, OHIO • BRANCHES IN PRINCIPAL CITIES



5 years, no change of oil

THIS midwestern die casting company called in a Standard Oil lubrication specialist when operations were started over five years ago. One of his recommendations specified the use of STANOIL Industrial Oil No. 18 in the hydraulic unit of the die casting machine shown. Now, after five years of service, this original oil is still in nearly perfect condition. There is no deposit and no varnish in the hydraulic system. There has been no need to clean the system.

This performance is typical of the results gained by STANOIL users who count on its greater oxidation stability and corrosion resistance to deliver trouble-free lubrication in speed reducers, head stock gears, auxiliary turbines, and compressors, as well as hydraulic systems.

The Standard Oil lubrication specialist in your own area can help put the advantages of versatile STANOIL Industrial Oil to work in your plant now. A call to your local Standard Oil (Indiana) office is all that's necessary. Why not do it today?

Standard Oil Company, 910 South Michigan Ave., Chicago 80, Ill.

STANOIL
TRADE MARK
Industrial Oil

What's your problem?

D. R. Clay, lubrication specialist at Standard Oil's Grand Rapids office, helped this manufacturer put hydraulic system lubrication on a trouble-free basis with STANOIL Industrial Oil.

One of a corps of such specialists, he makes his headquarters close to the plants he serves. He offers on-the-spot lubrication service that is backed by extensive experience and training in the application of modern lubricants and fuels. The same service is available to you wherever you are located in the Midwest through the lubrication specialist in your own locality.

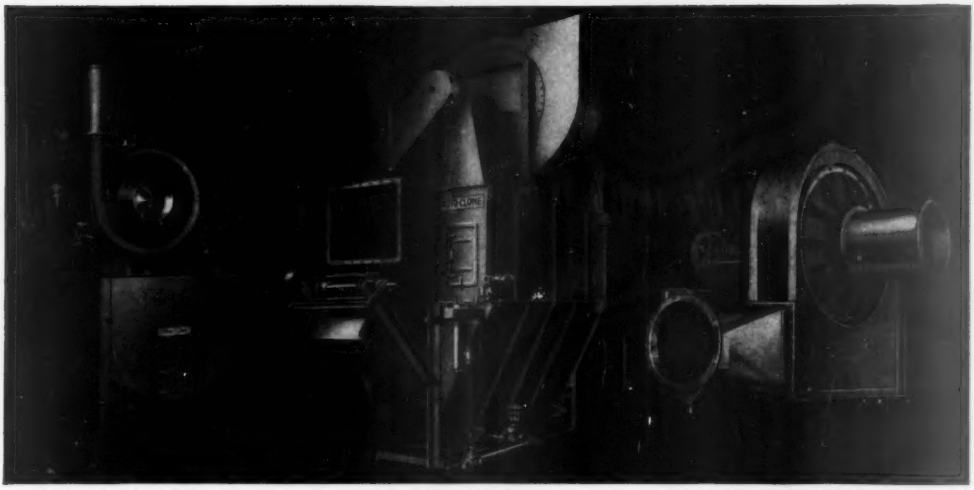
Arrange today for a visit by this specialist. Just phone or write the Standard Oil Company office nearest you. When he calls, ask for actual performance data on these outstanding products:

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types, SUPERLA Greases cover a wide range of operations.

STANORUST Rust Preventives—The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specially developed for its intended use. The grades range from a fingerprint remover to a heavy semi-solid that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY STANDARD *(Indiana)*

clean air costs less than dust!



Type D ROTO-CLONE
Arrangement B

Type N ROTO-CLONE
Arrangement C

Type W ROTO-CLONE
Arrangement A

ROTO-CLONES GIVE YOU
engineered dust control

AAF ROTO-CLONES are made in types, sizes and arrangements that solve most problems of industrial process dust . . . simply and efficiently, at lower cost. This is true of all three basic types of ROTO-CLONES • Type D for Dry collection • Type W for wet collection • Type N for hydrostatic collection. Each of these ROTO-CLONE types is furnished in several arrangements . . . the arrangement determining the method of disposal for the collected material.

To eliminate your dust problems with "Engineered Dust Control" call your nearby AAF representative or write direct for Dust Control Bulletin No. 270A.

ARRANGEMENT B

Hopper provides storage space for collected material, which is disposed of manually. Available for all types.

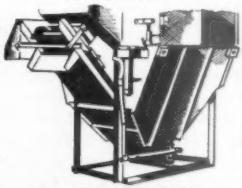
ARRANGEMENT C

Storage hopper with sludge ejector for continuous removal of collected material. Available for Type N and Type W.

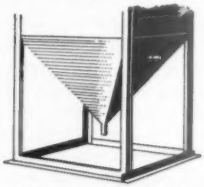
ARRANGEMENT D

Storage hopper with bottom outlet for continuous removal of collected material by sluicing for Type N and Type W . . . or by rotary valve for Type D.

Type W ROTO-CLONE
Arrangement B



Type N ROTO-CLONE
Arrangement C



Type W ROTO-CLONE
Arrangement D

American Air Filter
COMPANY, INC.
361 Central Avenue, Louisville 8, Ky. • American Air Filter of Canada, Ltd., Montreal, P.Q.
Pacific Division Office, San Francisco, Cal.

The Famous "Original" That Has Never Been Equalled

LUNKENHEIMER
King Clip Valve
Constantly Improved for More than Half A Century

The original "clip" valve was developed by Lunkenheimer in 1893. It's been imitated many times . . . but the know-how that created it and improved it through the years has kept Lunkenheimer's King Clip the prominent favorite. Here are a few of the reasons for its popularity . . .

- **Bronze stem-thread bushing is cast in the bonnet and machined with it. There's no stem binding or undue thread wear.**
- **Large, unobstructed drain channels permit free passage of fluids that tend to clog, congeal or freeze up.**
- **Bronze rolled-in seat rings provide bronze-to-bronze contact with the disc. Prevents corrosion. Results in trouble-free, low-cost service.**
- **The stuffing box can be repacked in seconds while the valve is wide open and under pressure.**
- **A gentle tug with a wrench brings the hexagon head gland out. No more prying "frozen" glands.**

Get the *first* and *best*—Lunkenheimer's King Clip—constantly improved for nearly 60 years. Ask your distributor for more information.

And write for Circular 561, describing the complete line in detail. Address: The Lunkenheimer Company, Box 360L, Cincinnati 14, Ohio.

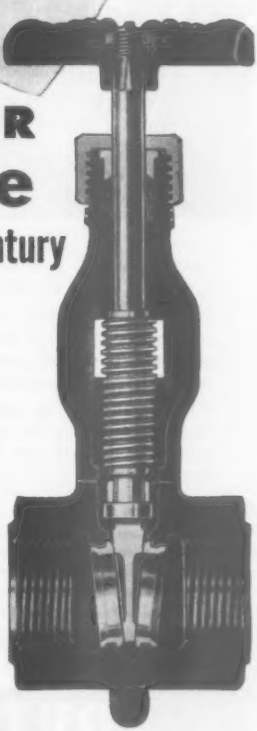


FIG. 1640

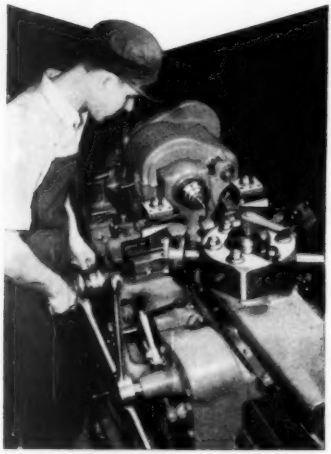
IRON • STEEL • BRONZE

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-151-3D

SOUTH BEND
2-H TURRET LATHES
for Exacting Operations



Accurate . . . fast . . . easy to handle, South Bend 2-H Precision Turret Lathes are highly efficient on second operations where tolerances and finishes are critical. Exceptionally wide ranges of power cross feeds, power longitudinal feeds, thread cutting feeds and power turret feeds provide maximum output for diversified jobs. *Write for Catalog 67-F.*

SPECIFICATIONS:

Collet Capacity—1". **Swing**—16¼". **Cross Slide Feeds**—48, .0006 to .0315". **Carriage Feeds**—48 R. H. or L. H., .0015 to .0814". **Thread Feeds**—48 R.H. or L.H., 4 to 224 per in. **Turret Feeds**—96, .0001 to .0148".

SOUTH BEND LATHE
SOUTH BEND 22, INDIANA

SOUTH BEND LATHES

A SPECIAL BOOK REVIEW

"Speak Up, Management!" *

Good employee communications is one of the most important problems facing management today—or any day.

It is also the subject of one of the best management books to come down the pike in a long time.

We think this book good enough to depart from our usual custom of publishing only brief descriptions of new books for plant operating executives.—*The Editor*

Reviewed by **CARROLL W. BOYCE** • National Affairs Editor, FACTORY

I HAVEN'T SEEN more than half a dozen books that can score 100% on the four tests by which I measure a management book:

1. The subject is of vital importance—on a long-term basis, as well as right at the moment.
2. The book is jammed with facts—both a quick re-statement of familiar principles, and down-to-earth case examples of sound, up-to-date practice.
3. The book is readable.
4. The author is sound.

Speak Up, Management! rings the bell on all four of those points. It's a book you'll find hard to put down once you start reading. I know my wife had trouble getting me to knock off for dinner, and then I read right through a television program I particularly wanted to see.

THE PROBLEM IS VITAL . . .

Every management man is "communicating" every day. He does some of it face to face. When that's the case, he's usually pretty successful. But he has to communicate with so many people that he can't do it all face to face. And the whole communications problem has become so complex that even face-to-face talking needs organization, structure, and purpose if it is to succeed.

Misinterpreted orders, gripe sessions, bitterness in strikes, and the "ism" fanatics in everything from economics to religion are evidence that we have not been successful.

Newcomb and Sammons have stated the problem—and its solution—for management this way:

"In recent years the employee mind has become the most complex institution in American industry. To comprehend it, we have psychologists and psychiatrists and survey experts. We have polls and tests and probes. Colleges and universities have courses of instruction in communication, and they conduct seminars designed to capture and classify the worker mind. . . . The worker may be pleased with all this attention, but the evidence suggests that he is unimpressed.

"The big communications job in industry, it becomes increasingly clear, is for management to persuade itself that communications is a local-level job. . . . The chambers of commerce and manufacturers groups can provide guidance and encouragement, and there are available to management many services to help put communications programs in motion. But beyond a point, nobody but the management can effectively go. Sooner or later, the Miles Standishes of industry must speak for themselves."

Turn the page

* **SPEAK UP, MANAGEMENT!** by Robert Newcomb and Marg Sammons. Published by Funk & Wagnalls, 153 E. 24th St., New York 11. 308 pp. Index. $5.

OILITE CAN HELP YOU NOW

Oilite Finished Machine Parts — with NO Machining

Here's how:

Oilite finished machine parts provide dependable replacements for bronze, brass, aluminum, cast iron, steel, and plastics. Frequently, replacements are permanent.

Oilite Material

Many Oilite raw materials, i.e., metal powders, are produced from by-products, readily available.

Tooling

Using Oilite finished machine parts, you save

- Tooling programs
- Tool Design
- Machine Tools
- Jigs and Fixtures
- Cutting Tools
- Gages
- Floor Space
- Skilled Manhours

Amplex type tools are, by comparison, inexpensive. Tool and die making facilities are available.

Delivery

Making Amplex tools generally requires only days or weeks and no additional machines.

Case Histories

Under conditions like today's we were in quantity production within six (6) weeks or less compared to eighteen (18) months by other processing.

Service

Our engineering and research covers a period of more than twenty (20) years in the production of Oilite metal powder products.

Home office personnel is augmented by a large staff of field engineers located in principal cities of the United States and Canada.

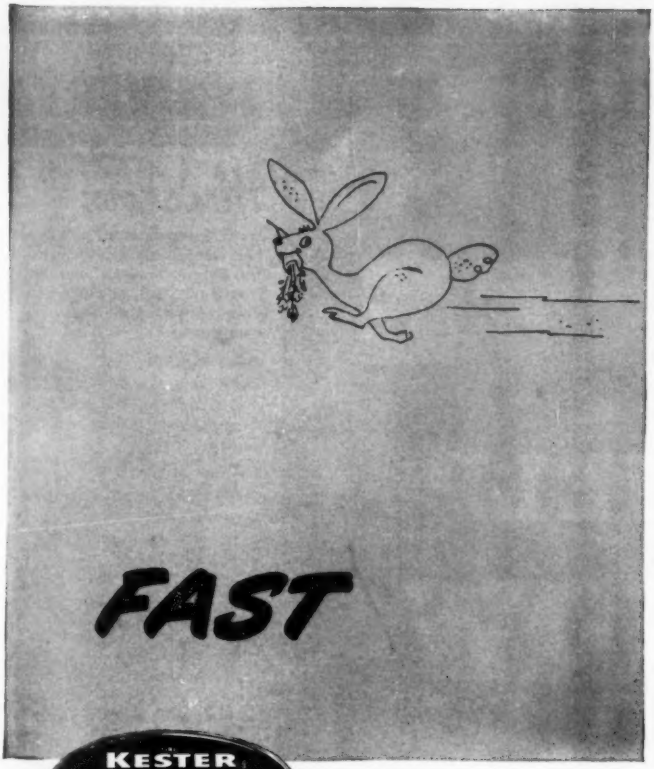
AMPLEX MANUFACTURING COMPANY

Subsidiary of Chrysler Corporation

DETROIT 31, MICHIGAN

OILITE PRODUCTS

OILITE PRODUCTS INCLUDE heavy-duty, oil-cushion, self-lubricating, ferrous-base bearings; Oilite bronze* and other nonferrous* bearings; self-lubricating cored* and bar* stock; permanent filters; and friction units.



KESTER FLUX-CORE SOLDER

FAST **In Soldering Action**
FAST **In Obtaining Wanted Results**

Kester can give you the exact percentage of flux content needed for your particular soldering operation. Only Kester has the proven ability to exercise this *flux control!*

Kester also has the greatest selection of Flux-Core Solders . . . Acid, "A", Nosput, Knorust, Plastic Rosin, "Resin-Five", "44" Resin and others in a wide range of diameters and impurity free alloys.

KESTER SOLDER COMPANY
4213 Wrightwood Ave., Chicago 39
Newark 5, New Jersey • Brantford, Canada

KESTER SOLDER

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 274

THE BOOK IS JAMMED WITH FACTS . . .

The authors have provided a quick review of principles in less than three pages of their introductory chapter. Their "ten commandments of good communications" are not only must reading but must *practices* for every management man, from foreman to president.

In the book, you'll find some elaboration on these commandments. Here we can give you only the subject headings, plus the authors' comment on the last one:

"The ten commandments of good communication:

"1. Be sincere. You can't make black out of white.

"2. Be simple and unaffected in your language.

"3. Don't over-glorify the company.

"4. Select competent personnel to handle your program.

"5. Make your communications a top-level supervisory responsibility.

"6. Don't ignore unsavory situations your employees know exist.

"7. Investigate all devices of communication, and use all that will help.

"8. Check constantly on the effectiveness of your communication.

"9. Never let your communications program slow down.

"10. *See the people.* There is no swami in industry good enough to read the minds of people he doesn't see. The communications expert who thinks he can mastermind a continuous program from behind a desk is kidding himself. He's got to get out and see the people."

As far as case studies go, the book is a gold mine. The authors

"Cuts cost three ways"

with Westinghouse MERCURY lighting

A tank company in Illinois ran cost studies on the new Westinghouse Mercury Lighting System. Results:

1. Operating costs are reduced because mercury vapor produces more light per dollar than any other light source.
2. Maintenance costs are cut because it takes fewer fixtures to produce high levels of illumination than with any other lighting system.
3. Lamp replacement costs are lower, because mercury vapor lamp life is 5,000 hours—5 times longer than the most efficient incandescent lamp.

This is one of hundreds of "time-tested" installations. Investigate the Westinghouse Mercury Vapor Line: 400, 1000 and 3000-watt units for low or high-bay areas . . . open or closed fixtures for clean or dirty locations . . . low or high-voltage ballasts for any distribution system.

Send for B-4727, **"Westinghouse Lighting at Work" in every industrial area.** Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE.. IF IT'S

Westinghouse

LIGHTING DIVISION

Edgewater Park, Cleveland

J-04295

Alabama By-Products Corporation

to Make More Coke and Coal Chemicals

to Meet Southeast's Fast Growing Demands

ALABAMA BY-PRODUCTS CORPORATION of Birmingham—one of the Nation's largest commercial coke producers—is now rushing to completion the fifth expansion program in its history. Because of the tremendously increased demand for coke from the Southeast's flourishing foundry trade, the Company is building a new battery of coke ovens which will bring its capacity to over 900,000 tons a year. It is likewise stepping up the output of its coal chemicals and by-product gas.

"Our large expansion program helps assure an ample supply of quality coke for the Southeast's fast growing malleable and grey iron industry," says Phil H. Neal, president of ABC. "Capacity of our plant has been increased more than fivefold since our Company was organized. Biggest factor in our growth has been the broad-scale industrial development throughout the Southeast. Another is Birmingham's superior location as a distribution center—not only for the whole Southeast but for all the 31 States we serve and our export markets in Canada, Cuba and Mexico."

ABC is one of scores of Birmingham district enterprises that have spiraled from small beginnings into nationally known industries. New plants will find even greater growth opportunities because of the accelerating progress of the South. Stake your claim now.

* * * * * *

The Committee of 100 or any of the undersigned members of the Executive Committee will welcome the opportunity to give you confidential and specific data regarding the advantages of the Birmingham district for your plant, office or warehouse.

BIRMINGHAM COMMITTEE OF 100

4914 Sixth Ave., N., Birmingham, Ala.

Executive Committee

Gordon Persons
Governor
State of Alabama

Bradford C. Colcord
President
Woodward Iron Co.

John S. Coleman
President
Birmingham Trust National Bank

Donald Comer
Chairman of the Board
Avondale Mills

William P. Engel
President
Engel Companies

W. W. French, Jr.
President
Moore-Handley Hardware Co.

Clarence B. Hanson, Jr.
Publisher
The Birmingham News

W. H. Hoover
President
Employers Insurance Co. of Alabama

Mervyn H. Sterne
Sterne, Agee & Leach

Claude S. Lawson
President
Sloss-Sheffield Steel & Iron Co.

Thomas W. Martin
Chairman of the Board
Alabama Power Co.

J. C. Persons
President
First National Bank

O. W. Schanbacher
President
Loveman, Joseph & Loeb

A. V. Wiebel
President
Tennessee Coal, Iron & Railroad Co.

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 274

are consultants on employee communications but the cases are by no means limited to their clients. In fact, the list of acknowledgments reads almost like the blue book of American industry—plus a batch of little-known companies that are doing outstanding jobs.

But the authors are careful to say: "You will not find in each case the perfect communications program. You will not find it anywhere." They have extracted the best elements from the best programs and reported them in this book.

One chapter alone—"101 Ways for Management to Speak Up"—is worth the price of the book.

Of course, you'll find complete chapters on how to get the most out of all the "standard" media of group communication: newsletters, handbooks, annual reports, bulletin boards, employee publications, open house, and employee and supervisory meetings.

Separate chapters are devoted to community relations; communications as related to war and defense problems; and the special problems (and opportunities) of visual and audio-visual communications.

THE BOOK IS READABLY WRITTEN . . .

When faced with a problem as important as employee communications, most folks tend to get preachy. That, say the authors, is one of the big problems.

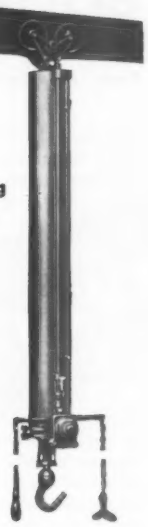
Newcomb and Sammons do some preaching, all right. It's needed. But they do it with a light touch.

For example, how do you tell management to get off its high horse and quit being so self-righteous about employees loitering in the washrooms? Certainly not the way I put it in that last

IT'S IMPORTANT

To SAVE MAN HOURS
REDUCE PRODUCTION COSTS
INCREASE EFFICIENCY
That's Why It Will Pay You to Investigate

CURTIS AIR COMPRESSORS
AIR-OPERATED
CYLINDERS & HOISTS

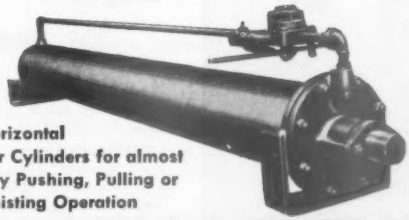


Vertical
Air Hoists
for Low Cost
Lifting or Lowering
of Materials
or Machines

Tank Mounted
Up to 15 H.P.
Inclusive—
Air Cooled

Water-Cooled Compressor,
Up to 50 H.P. Fully Enclosed

- Dust and Dirt Proof
- Carbon Free Valves
- Timken Bearings



Horizontal
Air Cylinders for almost
any Pushing, Pulling or
Hoisting Operation

I-51-1R

Curtis equipment has stood the test of time, because it is precision made from top quality raw materials with 98 years of "know how."

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1995 Kienlen Ave., St. Louis 20, Mo.

I am interested in items checked below:

☐ AIR HOISTS
Stroke? ☐ Capacity? ☐

☐ AIR CYLINDERS
Stroke? ☐ Capacity? ☐

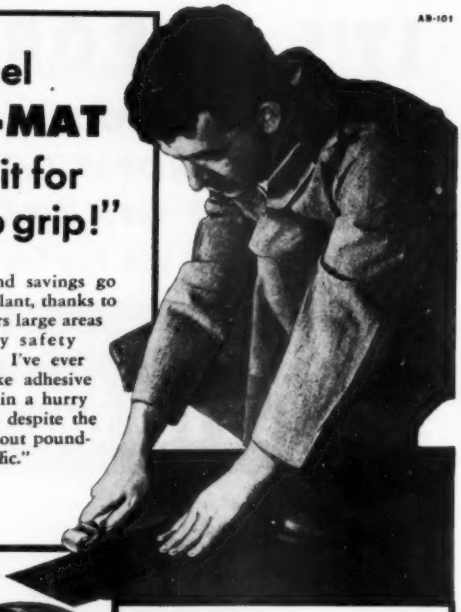
☐ AIR COMPRESSORS
Capacity? ☐ Pressure? ☐
Current? ☐

Name.....
Firm.....
Street.....
City.....Zone.....State.....

AB-101

"Peel FERA-MAT .....roll it for non-slip grip!"

"Speed, safety and savings go together in our plant, thanks to Fera-Mat. It covers large areas faster than any safety flooring material I've ever used. It peels like adhesive tape, goes down in a hurry and *stays safe* — despite the month-in, month-out pounding of heavy traffic."



"A trowel plus FERROX equals safety for me!"

"Fera-Mat's fine, but I'm sold on Ferrox for three good reasons. One, it trowels easily—perfect around machines and for uneven surfaces. Two, I get excellent coverage. Three, I save money with economical Ferrox and cut labor costs, too. Yes sir, Ferrox makes safety-sense to me."

Don't slip up on safety! Use either FERA-MAT or FERROX, depending on conditions in your plant. No matter what your "slippery floor" problem, you will find the answer in American Abrasive's wide-range line of non-slip treads and plates, including FERALUN, BRONZALUN and ALUMALUN.

Send today for AMERICAN ABRASIVE'S *Fact Folder on Safety Floorings*

AMERICAN ABRASIVE Safety Floorings

AMERICAN ABRASIVE METALS CO. · IRVINGTON 11, N. J.

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 274

sentence. Here's how Newcomb and Sammons combine their preachment on this subject with a bit of practical advice:

"One of the best spots [for a bulletin board] is the rest room. Some may observe, with virtuous dismay, that employees shouldn't be encouraged to loiter in rest rooms. The answer to that is: They loiter anyway, and they may as well loiter profitably."

Or maybe you want to knock down the idea—all too common in management—that editors of employee publications who quit in a huff are simply "high-strung newspaper men." You or I might try to develop a rebuttal based purely on logic. Or we might try soft soap. Newcomb and Sammons get the reader off balance—lull him into a sense of false security—then cut loose with a haymaker. Here's what I mean:

"A feeling of frustration is not an industrial malady that feeds solely on editors; many others at many levels are victims of it. But when the individual charged with interpreting management to its employees is so convinced of management's insincerity that he quits his job, management ought to take stock of itself. It is a danger signal, and it is very red."

Have you ever been called on to check anything that was slated to be published in your company's employee magazine? Chances are the editor didn't have enough nerve to read you a lecture on the fact that you're not a journalist—that your job is to verify facts for publication, not to try to tell a craftsman how to do his job.

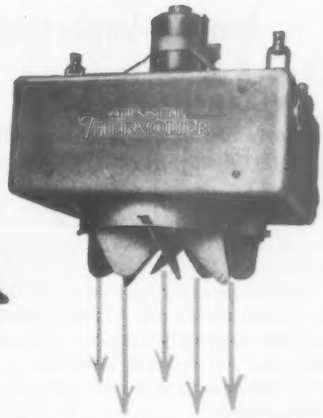
There are two sentences in "Speak Up, Management!" that I bet will make you less anxious to be an amateur journalist the next time you check copy:

Turn the page

DOWNRIGHT

better performance

Vertical Delivery
THERMOLIER
Unit Heaters . . .



RIGHT DOWN

where maximum heat is desired...

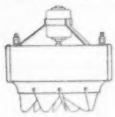
in warehouses, plants and other hard-to-heat buildings

HEATING COMFORT AND ECONOMY. Heat is forced down to the working level . . . not banked uselessly at the ceiling level. Thermoliers provide quick heating from a cold start. Desired room temperatures are easily maintained within a close range.

ADAPTABILITY TO EQUIPMENT AND FLOOR LAYOUT. The units and the simple piping are overhead where they do not interfere with arrangement of operating machinery or equipment and do not take up valuable floor or wall space. Units are easily relocated at any time to meet changes in plant layout or heating requirements.

LOW FIRST COST. Thermoliers are so efficient and so compact that their heating capacity is often equivalent to the capacity of cast iron radiation or pipe coils of twice the cost.

4 MODELS . . . . . 18 SIZES


Vertical Delivery

Horizontal Delivery

Textile Model

Velocity Nozzle

A thermostatic trap, the simplest and least expensive of all traps, is practical because of Thermolier's exclusive cooling leg.

Maximum capacity assured, annoying destructive water hammer eliminated — by built-in pitch of tubes and internal cooling leg which assure continuous drainage of condensate.

Damaging strains caused by expansion and contraction eliminated by "U" type expansion tubes.

Safety and durability assured with leak-proof tube-to-header construction.

Five other important construction features. Write for Thermolier Catalog.

GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company Inc., Providence 1, Rhode Island • Sales Offices and Warehouses in Principal Cities

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco humidification and cooling systems

SANITARY WASHING FACILITIES

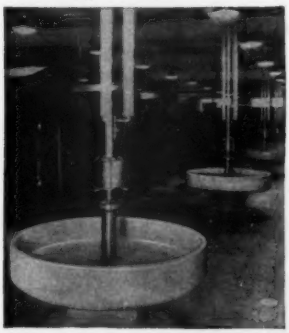
Are An Important Safety Factor

BRADLEY WASHFOUNTAINS

The Standard in Large and Small Plants Throughout the Nation

Modern facilities, good lighting, safety equipment, plus *sanitary washrooms* are all essential in maintaining high productive efficiency.

Year by year, for over 30 years, the use of *sanitary* Bradley Washfountains has been constantly extended because they help prevent skin affections, reduce maintenance, save water and speed wash-up time.



Fresh Running Water Supply Self-Draining Bowl

Up to 8 or more persons can wash simultaneously at a Bradley — each supplied with a fresh spray of running water which is carried off as it is used. Such facilities not only encourage proper washing but do it in the most sanitary manner. There is no collection of contaminating water, and with foot-control the hands need touch nothing but the water spray they are washed in.

Save Installation Time and Cost

Bradleys make big savings in installation costs because one Washfountain provides for as many persons as 8 to 10 single-person washbasins with one-eighth to one-tenth the number of piping connections.

Your plant probably has Bradley Washfountains but with greater numbers of employees or the addition of women, more washing facilities may be needed now.

No water waste. When men leave, water is cut off automatically

BRADLEY WASHFOUNTAIN CO.,
2215 W. Michigan Street,
Milwaukee 1, Wisconsin

And DUO-Washfountain for the Smaller Washrooms, First-Aid Rooms, Cafeteria Entrances, Lavatories

BRADLEY Washfountains

Distributed through Plumbing Wholesalers

Write today for a copy of Catalog 4701.

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 274

"The employee publication is everybody's baby, because everybody is an editor. Take away from an official his blue pencil and you have robbed the knight of his lance."

The book isn't all written in a joshing vein, by any means. But at no time does it get ponderous. And it's spiced with quotable anecdotes all the way through.

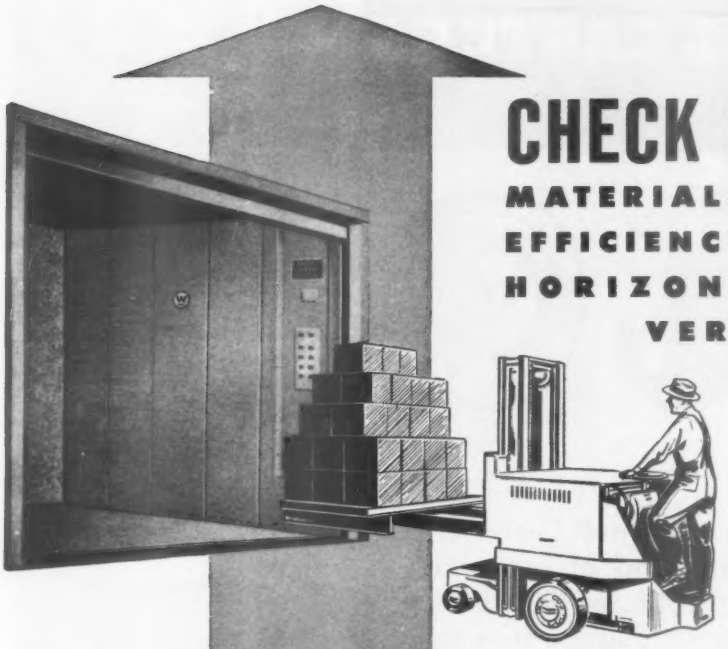
THE AUTHORS ARE SOUND . . .

Of course, such a conclusion is largely personal. Maybe you wouldn't agree. The only way to find out is to read the book.

I wish I could make this next statement with the same facility the authors displayed when writing on touchy subjects.

So, at the risk of oversimplifying the authors' "philosophy of communications," I'm going to quote one paragraph that I feel is typical of their whole approach to communication.

"There is a vast amount of syndicated matter available, with and without charge, on the great glories of full production and the grandeur that is America. But employees over the years have grown tone-deaf to this material. Their concept of free enterprise and of the industrial system is purely local. They prefer to see it work at their own plant, and understand it better when they do. . . . We are reaching the point in industry where a full-color illustration of the happy blacksmith, with tanned and sinewy arms, upon whose chest is tattooed the legend, 'Thank God we're all Americans,' has the emotional wallop of grapefruit juice. In time of war, the patriotic poster has its rightful and useful place. But the principles of the democratic system in normal times are



CHECK POINT FOR MATERIALS HANDLING EFFICIENCY . . . WHERE HORIZONTAL MEETS VERTICAL

Today you're facing tough problems. And the solution to these problems calls for constant checks on every operation to cut out inefficiencies.

When you come to checking your materials handling system, don't overlook the point where your hand and power trucks meet your freight elevators. For unless your freight elevators are a planned part of your overall handling system, supplies and parts can't move smoothly . . . and your handling costs climb fast.

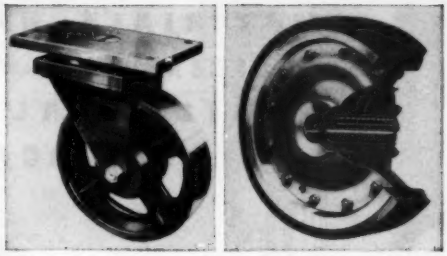
To help you plan your vertical transportation for peak efficiency, Westinghouse offers "The Buyer's Guide for Freight Elevators", B-4402. This is the most complete source of vital information available on the proper selection and application of freight elevators. For your free copy of this book, write Westinghouse Electric Corp., Elevator Division, Dept. M, Jersey City, N. J.

WESTINGHOUSE FREIGHT ELEVATORS

YOU CAN BE SURE... IF IT'S Westinghouse

J-98606

DARNELL CASTERS



There is a type of Darnell Caster or Wheel for every kind of use and floor. Made for light, medium and heavy-duty service, you are sure to find in the Darnell line the exact caster or wheel to meet your individual requirements . . . Ask your distributor for your copy of the new 192 page Darnell Manual

FREE MANUAL

Always SWIVEL and ROLL

DARNELL CORP. LTD., 60 WALKER ST. NEW YORK N.Y.
LONG BEACH, CALIFORNIA, 36 N. CLINTON, CHICAGO, ILL.

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 274

best sold at the local level, in the plant employee's language."

And now I'll preach: If you found yourself in agreement with that attitude, you'll enjoy this book as reading and find it useful as reference.

If, on the other hand, you found yourself disagreeing, there are parts of this book you won't enjoy one bit. They'll sting. But you'll still find it good reading, and a good investment.

For Top Management

INCENTIVE MANAGEMENT
By **James F. Lincoln**, Lincoln Electric Co., 12818 Coit Rd., Cleveland 1. Appendix of charts, tables, and references. 280 pp. $1.

Mr. Lincoln puts forth "incentive management" as the challenging solution to labor-management friction in the present day. The skill of a factory worker or supervisor, he feels, determines the money he makes, the personal satisfaction he gains from his job, and the value the customer receives. And anything that will increase individual skill in cooperation with the skill of others, makes for a better product and greater worker satisfaction. The mainspring of that development of skill, as Mr. Lincoln sees it, is incentive.

How you can put this incentive into your business, just as you put it into other phases of your life, is the main theme of the book. Coming from the head of a company that has been a successful advocate of incentives in industry, this book makes extremely interesting reading.

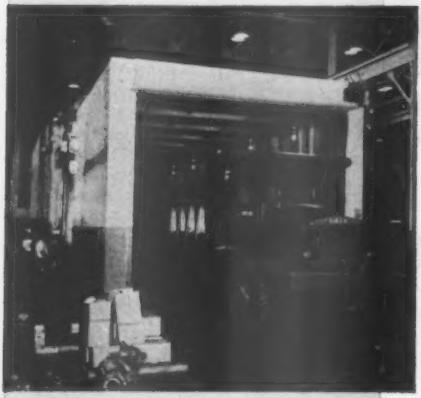
Turn the page

COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT

Mahon Hydro-Filter Spray Booth Specially Designed to Accommodate the Large Units of Road Building Machinery and Special Vehicles Produced by The Euclid Road Machinery Company, Cleveland, Ohio.

Euclid Heavy Road Machinery and Special Vehicles are Painted in Mahon Finishing System!



A Large Completely Assembled Euclid Rear-Dump Truck Emerging from the Mahon Finish Baking Oven. This is the Exit End of a Complete Mahon Finishing System.

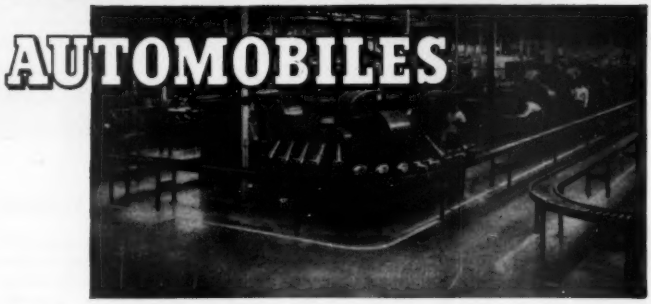
The Mahon finishing system installed in the Euclid Road Machinery Company's plants, Cleveland, Ohio, is another good example of Mahon equipment planned and engineered to meet the unusual requirements of a manufacturer's products and his production methods. The main painting production line for completely assembled products includes a Cleaning and Masking Booth, a specially designed Hydro-Filter Spray Booth, and a Finish Baking Oven. Other Mahon finishing equipment in this company's plants includes three Prime Coat Spray Booths and a Dip Prime Coating System for castings. If you are contemplating new finishing equipment, or have a finishing problem involving such equipment, it will pay you to call in a Mahon engineer. You can do this with complete confidence, because the Mahon organization has pioneered development in this highly specialized field for over thirty years . . . the experience of planning, engineering, building and installing thousands of finishing systems for every conceivable product, under widely varied plant conditions and production requirements, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon's insert in Sweet's Mechanical Industries File for information, or write for Catalog A-652.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-Off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens; Core Ovens, Hydro-Foam Dust Collectors, Dust Traps, Fog-Filters, and other Units of Special Equipment.

MAHON



Production increased — handling costs cut — in these and many other industries with Standard Conveyors.

The installations shown above are representative of the range and versatility of Standard Conveyors. An experience record of more than 45 years, serving all classes of industry and business, qualifies Standard to be of service on any conveyor need — roller, belt, slat, chain, wheel, push-bar, sectional, portable, self-contained conveyor units — pneumatic tube systems. Write —

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul, Minnesota
Sales and Service in Principal Cities

Write to Dept. FM-12 for valuable reference book "Conveyors by Standard" and tell us what you want to convey.

ROLLER • BELT • SLAT • CHAIN • WHEEL
PUSH-BAR • SECTIONAL
PORTABLE CONVEYOR UNITS:
HANDIBELT • HANDIPILER
INCLINEBELT • LEVEL BELT • EXTENDOVEYOR
UTILITY BELT-VEYOR • HANDI-DRIVE
VERTICAL LIFTS • PNEUMATIC TUBE SYSTEMS

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 274

For Front-Line Supervisors and Personnel Executives

FUNDAMENTALS OF SUPERVISION

By Charles F. Harad. Delmar Publishers, Inc., Orange St. & Broadway, Albany 7, N. Y. Illustrations, charts, tests, review problems, index. 215 pp. $3.75.

Faced with the pressing need for upgrading employees into positions of greater responsibility? If so, you'll find that one of your biggest problems is teaching them to direct the efforts of others. Well, here's a training manual that may help you do the job.

Fundamentals of Supervision takes the new supervisor through the three major areas of his responsibility—his relation to his organization, his job, and his workers. The course is divided into 28 unit lessons, each complete in itself. You can use the course complete, or select sections to fit in with your own supervisory training requirements. A "Conference Leader's Guide" ($2) contains a detailed instruction schedule for the leader of the training group.

Book Briefs

PERSONNEL ADMINISTRATION

By Pigors & Myers. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, 614 pp. $6.

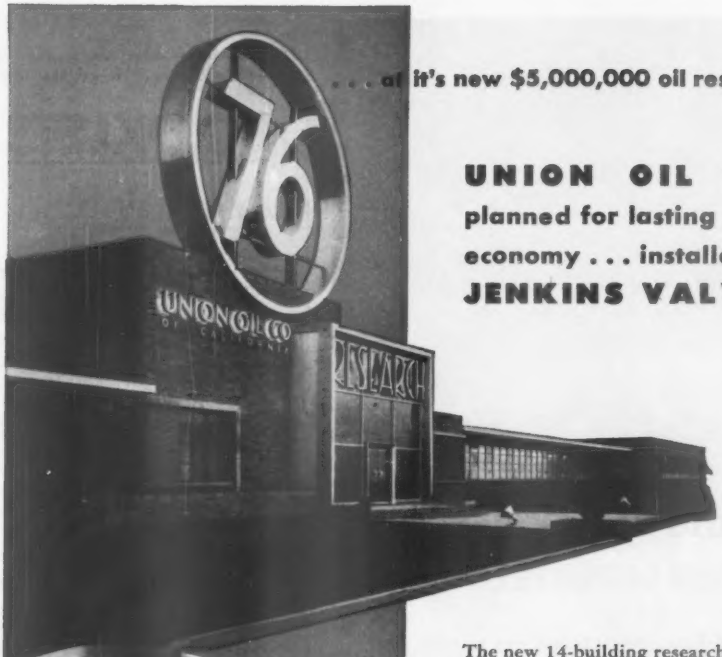
THE GRINDING WHEEL

By Kenneth B. Lewis. The Grinding Wheel Institute, Greendale, Mass. A textbook of modern grinding practice. Illustrations, tables, glossary, bibliography, index. 409 pp. $3.50.

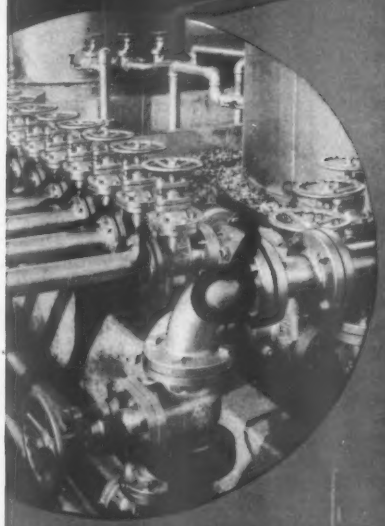
Turn the page

. . . at it's new $5,000,000 oil research center

UNION OIL COMPANY
planned for lasting economy . . . installed JENKINS VALVES



Architects
AUSTIN, FIELD & FRY, LOS ANGELES
General Contractors
P. J. WALKER CO., LOS ANGELES
Mechanical Contractors
S. GLEN HICKMAN CO., LOS ANGELES
Consulting Mechanical Engineer
SAMUEL L. KAYE, LOS ANGELES



SOME OF THE 3000 JENKINS VALVES installed at the new research center. Many structural innovations, designed to simplify maintenance, are unique in this plant. Tunnels between buildings carry all pipelines, make them readily accessible. Air-conditioning system supplies 100% fresh air to laboratories at all times. The administration building, shown above, is one of 14 major buildings on a 100 acre site.

The new 14-building research center of the Union Oil Company of California is unique in many features of design. Here, a research staff of 250 will have every modern facility for developing products that will shape the company's future progress.

The same future-minded attitude was maintained toward plant operating costs by the architects and engineers who specified equipment. To insure lasting efficiency and maintenance economy, they chose Jenkins Valves for more than 3,000 control points on the miles of steam, water, sanitation, fire-control, and other pipelines essential to operations.

Like so many of the nation's top-flight building specialists, these men have confidence in the *extra measure* of efficiency and endurance built into Jenkins Valves.

Despite this extra value, *you pay no more* for Jenkins Valves. For new installations, for all replacements, let the Jenkins Diamond be your guide to lasting valve economy. Jenkins Bros., 100 Park Avenue, New York 17; Jenkins Bros., Ltd., Montreal.

JENKINS
LOOK FOR THE DIAMOND MARK
VALVES
SINCE 1864 TRADE JENKINS MARK
Jenkins Bros

Now! **KEX PUTS SAFETY MESSAGES RIGHT INTO YOUR EMPLOYEES' HANDS**

HERE'S AN ADDITIONAL KEX SERVICE that ties in with your *Safety Program*—flashes its messages to the employee right at a place *where accidents happen*. And builds better employee relations.

Now a percentage of KEX* towels have printed on them safety slogans such as—Work Safely—Apply More Caution; Alert Today—Alive Tomorrow; Always Alert—Nobody Hurt; to mention a few.

In these days when skilled hands are so important, KEX puts into them not only a wiping tool that does a faster, more efficient job, but which also helps protect them.

INVESTIGATE KEX NATIONAL SERVICE—the smooth-flowing service that means regular delivery of industrial wiping towels, in any desired quantity, that are hygienically clean, uniform in size, weight and quality, are highly absorbent, and simplify plant housekeeping.

No investment. Nothing to buy. Only a low rental charge per towel. *And your source of supply of KEX safety towels is automatically assured!* Look for your local KEX distributor in your classified phone book. Or write—

KEX

"KEX" NATIONAL SERVICE

*REG. U.S. PAT. OFF. 295 Fifth Ave., New York 16, N. Y.

For copies of books and booklets reviewed, write directly to publisher listed

BOOKLETS

Begins on page 274

HOW INDUSTRY IS SOLVING ITS PACKAGING PROBLEMS. American Management Assn., 330 W. 4nd St., New York 36. A series of papers on efficient packaging of plant products. In addition to package design, there are discussions of package printing, shock protection and cushioning, and the proper maintenance of packaging equipment. 39 pp. Members, $1; non-members, $1.25.

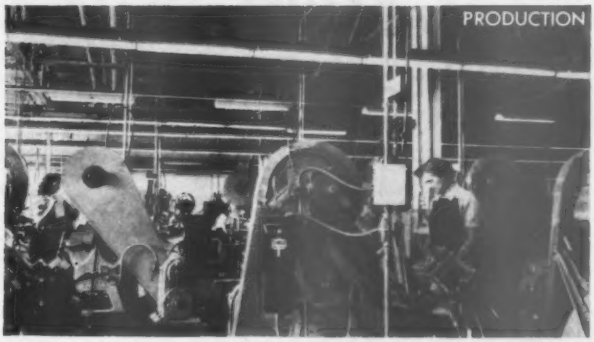
RAPID IDENTIFICATION OF SOME METALS AND ALLOYS. The International Nickel Co., Inc., Development & Research Div., 67 Wall St., New York 5. To salvage metal intelligently you should know the scrap content. You can if you use the simple spot-tests outlined in this booklet. 48 pp. Free.

A BASIC TRAINING MANUAL ON STATISTICAL QUALITY CONTROL. St. Louis Society for Quality Control, 6651 Kingsbury, St. Louis 5. Here's an aid to in-plant instruction in elementary statistical quality control. There's a brief text of fundamentals. But the heart of the manual is a series of work sheets that allow the student to work out problems in sampling and frequency distribution. 77 pp. $2.50.

MANHOOD OF INDUSTRIAL ENGINEERING. American Institute of Industrial Engineers, Inc., 40 W. Gay St., Columbus, Ohio. An extremely interesting analysis of the effects of language on labor - management relations. In a case study the author shows how "shades of meaning" influenced an actual wage negotiation. 52 pp. $1.90.

Would you rather catch rejects here

...or prevent them here?



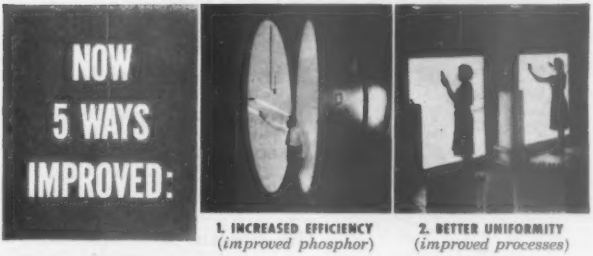
Photos courtesy Tinnerman Products Co., Cleveland, Ohio

...with G-E fluorescent lamps

THE inspection table is the best-lighted area in most plants today. Yet, good lighting here can only help to *catch* mistakes after they have been made, and time and materials already wasted.

The way to *prevent* errors from happening is through better lighting on the production line, with General Electric "5-way improved" fluorescent lamps. Their light is cool, with less glare and fewer shadows. Workers see better . . . work better. Newest form of fluorescent is G-E slimline—up to 8′ long. Slimline advantages include: single pin base for easy replacements, lower upkeep because of fewer replacements, and instant starting. Call your General Electric lamp supplier.

FREE BOOKLET! How to light up for better production. For your copy of "Planned Lighting for Industry," write General Electric, Department 166-F-1, Nela Park, Cleveland 12, Ohio.



1. INCREASED EFFICIENCY (*improved phosphor*)

2. BETTER UNIFORMITY (*improved processes*)

3. LESS END BLACKENING (*purer materials, more accurate controls*)

4. LONGER LIFE (*newer materials and methods*)

5. BETTER COLOR RENDITION (*new phosphor in Deluxe White lamps*)

You can put your confidence in—

GENERAL ELECTRIC

● To merit the shield that identifies CERTIFIED STARTERS, starters are subjected to severe tests by Electrical Testing Laboratories, Inc.

Among the many tests to make certain the starters meet the precise specifications, are those that assure the user he will get positive starting and at least 36,000 operations from a CERTIFIED STARTER.

if you want **MAXIMUM LAMP LIFE**
REDUCED MAINTENANCE COSTS
INCREASED FLUORESCENT LIGHTING SATISFACTION

insist on CERTIFIED STARTERS for every installation — new or old.

Certified Fluorescent Starter Manufacturers

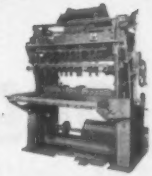
2116 KEITH BUILDING • CLEVELAND 15, OHIO

Automatically LIDS MIXED SIZE BOXES

fmc RANDOM SIZE BOX LIDDER

up to 600 per hour

The *fmc* Random Size Box Lidder meets the demand for a nailing machine which lids boxes of mixed sizes fed from a common conveyor. One operator can lid up to 600 boxes per hour on this fast and versatile machine. As boxes of mixed sizes are fed into the machine it automatically adjusts to the proper size, drives the required number of nails and discharges the lidded box on an outgoing conveyor, taking the place of several nailing machines which would otherwise be required to handle the same volume and variety of production.

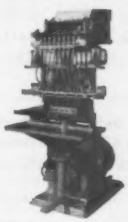


fmc INDUSTRIAL EDGE NAILER

Includes most features of standard Industrial Center-Line Nailer with special chuck arrangement which permits work to pass in front of the machine as well as through it. Designed for edge nailing, crate and box framing, cleating.

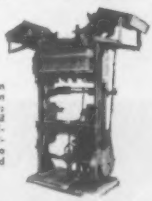
fmc INDUSTRIAL CENTER-LINE NAILER

Designed for large scale industrial nailing — wide pattern selection. Picks and drives up to 24 nails per stroke; all type nails, 3d to 10d. Open back machine; standard widths 48", 66"; others available.



fmc CLOSED BACK FC NAILER

Accommodates work from 1" to 18" deep, 8 run nail feed; 8 nail drive; handles 4d, 5d and 6d nails. Ideal for flat nailing, box making, cleating and lidding; also ammunition box end making.



fmc AMMUNITION BOX MAKER (AC-5A)

Adjustable heavy duty machine for nailing sides and bottoms in three strokes to ends of various types of ammunition and industrial boxes no larger than 16" high, 16" wide and 26" long.

OTHER *fmc* NAILING MACHINES . . .

SEND FOR ILLUSTRATED BULLETIN

FOOD MACHINERY AND CHEMICAL CORPORATION

PACKING EQUIPMENT DIVISION • RIVERSIDE, CALIFORNIA

Dept.____

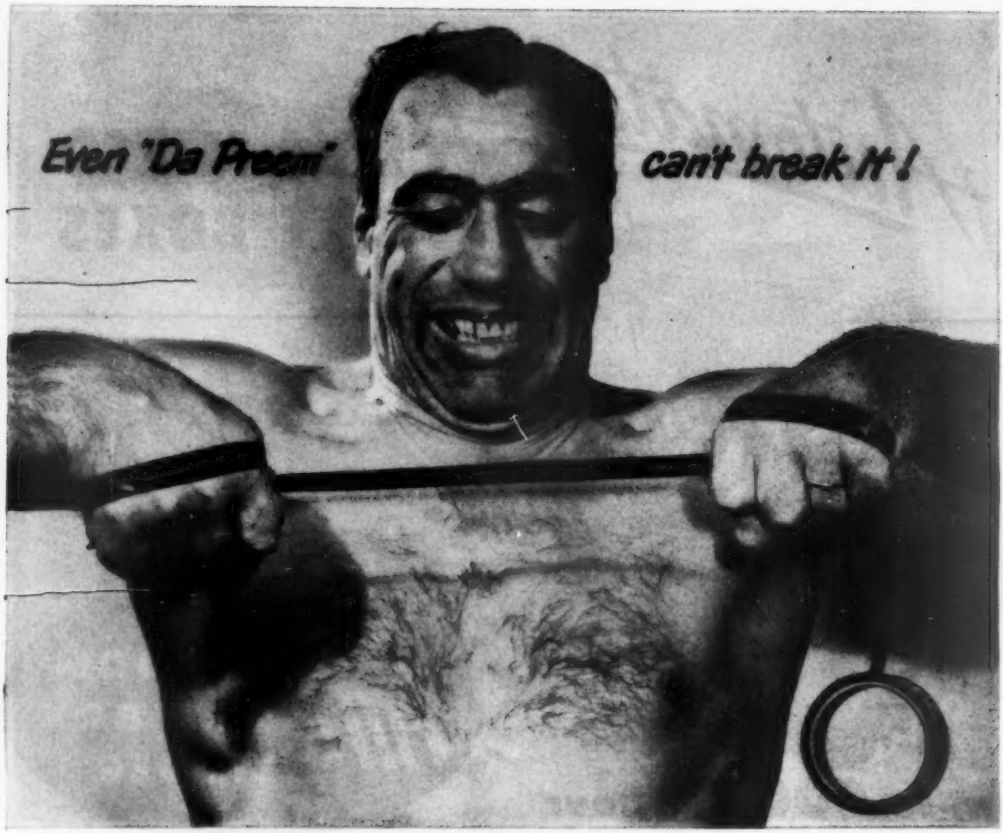
- RANDOM SIZE LIDDER ☐
- CENTER-LINE NAILER ☐
- EDGE NAILER ☐
- FC NAILER ☐
- AC-5A NAILER ☐

NAME_____

STREET AND NO._____

CITY_____ STATE_____

NM-20 B



World's strongest tape?

Powerful Primo Carnera proves the startling strength of "SCOTCH" Brand Filament Tape No. 880—the stick-at-a-touch, pressure-sensitive tape that holds in place the last lap of huge coils of strip steel at Crown Cork & Seal Co., Baltimore. And this tape can save *you* real money on your packaging too!

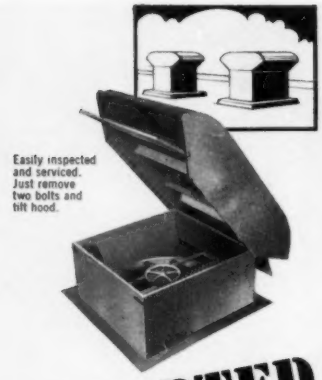
OTHER STRAPPING MATERIALS scratched steel, caused waste, required special application equipment at Crown Cork & Seal Co. Now short strips of "SCOTCH" Brand Filament Tape do a better job in less time. Order from your distributor today!

Quick Facts about "SCOTCH" Brand Filament Tape

- **SHOCK-RESISTANT**—absorbs jolts and jars again and again.
- **SAFE**—no sharp edges to injure workmen.
- **ECONOMICAL**—short strips handle big jobs.
- **TOUGH**—5 times the tensile strength, 50 times the tear-resistance of most industrial tapes.

The term "SCOTCH" and the plaid design are registered trade marks for the more than 100 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—also makers of "SCOTCH" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: Minn. Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N. Y. In Canada: Minnesota Mining & Mfg. of Canada, Ltd., London, Canada.

it's the unseen quality that produces true economy in Gaylord Boxes
End of the Production Line...
Start of Extra Product Protection
Off they come! And after a final check for precision cutting and accurate printing they're on the way.
Here is all the sturdiness and durability that modern science can provide in a shipping container.
Gaylord Boxes are designed and built to provide superior product protection... and they do just that — all the way!
Call your nearest Gaylord Sales Office for competent help in solving your packaging problems.
Gaylord Boxes
GAYLORD CONTAINER CORPORATION
General Offices:: SAINT LOUIS
New York • Chicago • San Francisco • Atlanta • New Orleans • Jersey City • Seattle
Indianapolis • Houston • Los Angeles • Oakland • Minneapolis • Detroit • Columbus
Fort Worth • Tampa • Dallas • Cincinnati • Des Moines • Oklahoma City • Portland
Greenville • St. Louis • San Antonio • Memphis • Kansas City • Bogalusa • Chattanooga
Milwaukee • Weslaco • New Haven • Amarillo • Appleton • Hickory • Greensboro • Sumter
Jackson • Miami • Omaha • Mobile • Philadelphia • Little Rock • Charlotte • Cleveland
CORRUGATED AND SOLID FIBRE BOXES
FOLDING CARTONS
KRAFT BAGS AND SACKS
KRAFT PAPER AND SPECIALTIES



ACCEPTED
All Over America

Allen
HIGH-EFFICIENCY
ROOF FAN

Companies* with ventilation problems as diversified as the products they manufacture are turning in increasing numbers to the Allen-engineered, power-driven, High-Efficiency Roof Fan. Rugged construction, low power consumption, ease of installation, ability to fit smoothly into various architectural styles, large air removal capacity, and *low* initial cost and maintenance recommend it to plant managers' attention. This Roof Fan efficiently removes air laden with heat, fumes, vapor, dust. Available in wide range of capacities (750 to 45,000 cfm), many sizes, and in Standard, Direct Drive, and Remote Drive types. Write for catalog on complete line of roof ventilators.

* *General Motors Corp., Dow Chemical Co., National Biscuit Co., Hughes Aircraft Co. — and many others.*

Representatives in principal cities are listed in our catalog in Sweet's Architectural File, Section 20b.

ALLEN ENGINEERED VENTILATION
PRODUCTION PLANNING CO.
ROCHESTER, MICH.
Roof Ventilators for Every Industrial Need

FILL OUT AND SEND COUPON

PRODUCTION PLANNING CO
ROCHESTER, MICH.

Please send me informative literature on your complete line of roof ventilators.

Firm _____
Name _____
Position _____
Address _____
City, State _____

An Educator Tells You . . .

How to Plan Your Plant Movies

Are you misusing your industrial films? It's easy to do. Better not take any chances. Take a peek at this article. You'll get expert advice on what makes a good plant film program—plus a list of books, booklets, and catalogs that make the planning easier.

By J. J. JEHRING, Assistant Professor
New York State School of Industrial & Labor Relations
Cornell University

TRAINING FILMS are like statistics. They're good tools—if you know how to use them. But if you don't, they'll only waste your time and add to everyone's confusion. Here's an outline of simple steps you can take to make a more effective tool of the film program in your plant.

PICK AN OBJECTIVE FOR YOUR PROGRAM • Choose a specific goal rather than a general one. For example, instead of having as your objective "training management how to handle grievances," make it "training people in the use of the interview in handling grievances." That pinpoints your thinking toward a single problem.

GET THE RIGHT FILMS • Films can be bought, rented, or borrowed free from local film libraries throughout the country. Catalogs supply information on what's available and how much it will cost to use. (You'll find a list of catalogs and other helpful books at the end of this article.) And you can supplement the catalogs by following the monthly "Industrial Films" column in FACTORY (page 302, this issue.)

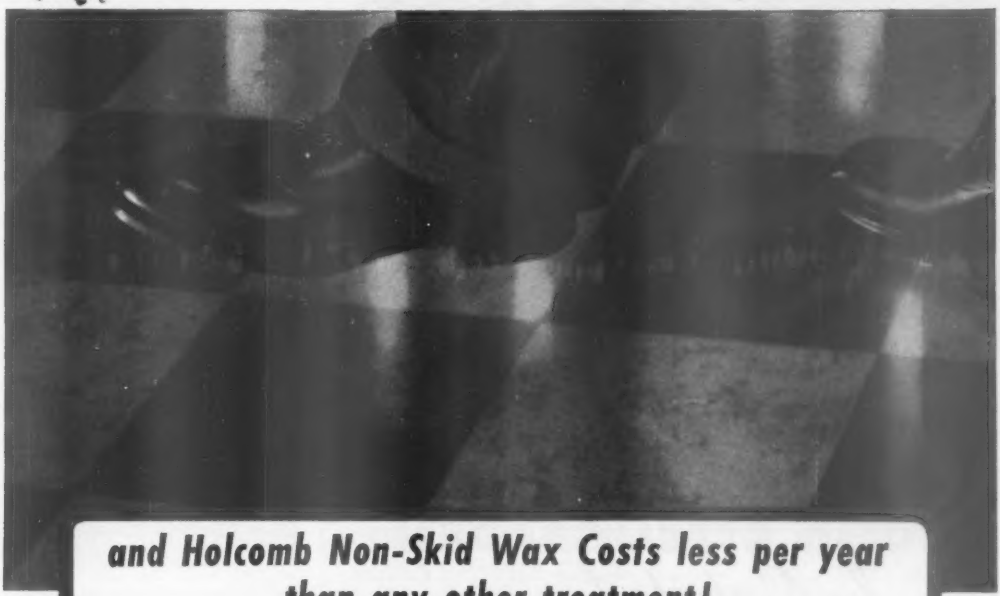
The film user generally pays the postage — express or parcel post—and is instructed to return films immediately after showing. That's because films are scheduled for a number of successive showings. Your failure to return films promptly will throw off that schedule, and probably result in extra rental charges or blacklisting by the film library. . . .

EVALUATE THE FILM • Preview them before use. If the film is part of a formal program, make sure your instructor sees it. Check whether it helps you gain your objective by having several people rate it in terms of (1) the audience, (2) the objective, and (3) the educational principles involved. (A rating sheet often helps. You can get a sample one from the author on request.) . . .

USE THE FILMS PROPERLY • There are four general classifications for training films: (1) skill training, (2) informational, (3) attitude forming, and (4) entertainment. Most films are a combination of all four. But you can emphasize what your'e after in your . . .

. . . **Introduction.** This tells the audience exactly what to look for in the film. It explains why they're seeing it. Careful introductions are especially helpful in skill-training and informational films. They're less important wtih attitude and entertainment films because those types are made to do

Looks slick~but it's skidproof!



and Holcomb Non-Skid Wax Costs less per year than any other treatment!

● You're *safe* with Holcomb Non-Skid Wax —Underwriters' Laboratories tests proved it has greater coefficient of friction. And you're sure to save money—for Non-Skid cuts waxing time, cuts number of waxings, keeps floors beautiful longer.

Non-Skid is one more development from the Holcomb research laboratories which concentrate on cutting cleaning costs. Holcomb builds materials that reduce the time cost—which is 95% of your cleaning dollar. Holcomb supplies waxes for every type floor surface; soaps and cleaners for use throughout your plant; brushes and cleaning equipment expressly designed for industrial and institutional needs.

Your nearby Holcomb Serviceman will come into your plant, make a complete cleaning survey, give you the best recommendations for walls, floors, ceilings, and machinery.

It will pay you to standardize with Holcomb—your one source, your dependable source, for scientific cleaning materials. Research laboratory and factory, Indianapolis 7; branches in New York and Los Angeles.

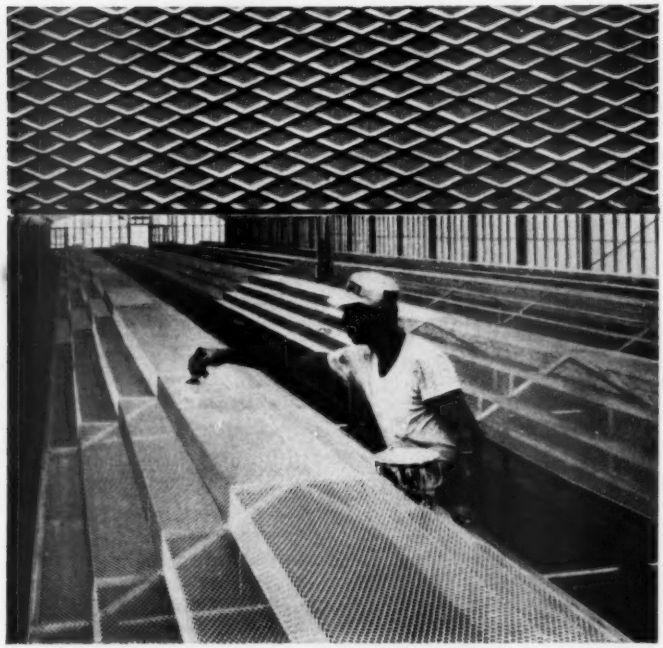
J. I. HOLCOMB MANUFACTURING COMPANY

Scientific cleaning materials

Factory Floor Brush. Three brushes in one—Bassine center, removes heavy, sticky dirt; Tampico middle row for medium dirt; outside row of stiff black horsehair for fine dirt and dust.

R.O.G. Powdered Hand Soap. Cleans in a flash. No chapping or burning of hands. Has two cleaning actions—chemical and fine abrasive. Convenient, economical, modern dispenser.

Purltine. The all-purpose, free-rinsing cleaning powder, the fastest ever developed. Water-softener, dirt-digger, free-rinser. 100% soluble—100% active—in hot or cold water.



SOLID STEEL GARDEN
for Orchids!

Lighter, stronger racks of Wheeling Expanded Metal support more than three and a half miles of orchids for A. N. Pierson, Inc., world's largest grower of flowers! Not woven, not welded, but pierced and s-t-r-e-t-c-h-e-d from a single sheet of sturdy solid steel, ExM is your material of a thousand and one uses —wherever you want strength, lightness, free passage for light and air.

SOL EEL
YOU SEE
TH HI

IT'S WHEELING EXPANDED METAL!

Wheeling

WHEELING CORRUGATING COMPANY
WHEELING, WEST VIRGINIA
Atlanta Boston Buffalo Chicago Columbus Detroit Kansas City
Louisville Minneapolis New Orleans New York Philadelphia Richmond St. Louis

HOW TO PLAN YOUR PLANT MOVIES

Begins on page 294

their job without comment from an instructor. Next thing is your . . .

. . . **Presentation.** Big thing to remember is to eliminate all possible sources of distraction. Prepare your projection room—before your audience arrives—as follows: (1) check electrical outlets; (2) set up screen and projector and test, so that you're ready when audience is; (3) arrange chairs so all can see properly; (4) check lighting; and (5) check sound level. After your audience has seen the films, better think twice before you let them go straight back to work. You may want to drive the lesson home.

USE THE RIGHT FOLLOW-UP · There are two kinds of follow-up. Most skill training films need the *action follow-up*. This allows your trainees to practice what they learned from the film. It's important to have them do this before they forget the lesson taught.

In cases where you want to lead your audience to a clearer grasp of facts, the *discussion follow-up* is your answer. This is generally necessary after informational films. It can also precede the action follow-up of skill training films by giving the trainee more information before he actually practices the skills outlined.

If you use the discussion follow-up, you'll want to run your forums in one of the following ways:

Informal group. For use with small groups, 6-20 persons; single discussion leader, entire group participates.

Lecture. For large audiences; film-lecture-questions.

Debate. Film-argument-questions about arguments; two films with different views can be used.

Symposium. Film presents a problem; solution given by each side.

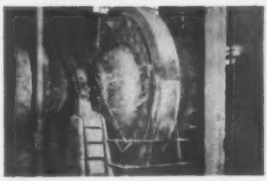
Panel. Small group carries on informal discussion before large

IN ALL INDUSTRIES

LUBRIPLATE LUBRICANTS

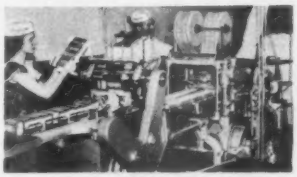
EXCEL IN REDUCING FRICTION, WEAR, UPKEEP-COSTS AND POWER-CONSUMPTION...WITH BETTER MACHINE PERFORMANCE

"LUBRIPLATE NO. 630-AA is practically a universal lubricant" –so writes the SPOKANE PORTLAND CEMENT CO. of Irwin, Wash.



"With the introduction of LUBRIPLATE No. 630-AA, we were able to reduce our requirements so that today we are satisfying all our needs for solid type lubricants with only two LUBRIPLATE Products. LUBRIPLATE No. 630-AA might almost be considered a Universal Lubricant. Furthermore, it has effected a marked savings in lubricants and labor."

Frank D. Neill
General Superintendent



LYNCH CORPORATION of Toledo, Ohio, a leading manufacturer of packaging machinery says:

"THIS LUBRICANT REDUCES SERVICE CALLS"

"The majority of our machines are used in places where it is necessary to wash them with steam and hot water after each day's use. This naturally would remove any ordinary lubricant and trouble would develop if the machines were not immediately relubricated. With LUBRIPLATE there is always a film left on the machine after washing. Our Service Engineers can readily spot machines that have had other than LUBRIPLATE Lubrication, as these machines do not give the service they should."

"THIS LUBRICANT SAVES 7 TIMES ITS COST IN PRODUCING SHOES" –says WOLVERINE SHOE AND TANNING CORP.

"You recommended to us LUBRIPLATE No. 100 for lubricating the chain drive on our paddle wheels which turn the hides immersed in a solution in concrete vats. The chain during use is always soaked in a solution that is sometimes acid and sometimes caustic. Up to that time we had not found any lubricant that would stay on the chains for any appreciable time. The average life of a chain was approximately one year. Since we have applied LUBRIPLATE to these chains every two weeks for two years, not one chain has required replacement, and they are still going strong.

"At this time it appears that for every dollar we have invested in LUBRIPLATE, we have saved seven dollars in chains."

REGARDLESS OF TYPE AND SIZE OF YOUR MACHINERY LUBRIPLATE LUBRICANTS IMPROVE OPERATION AND GREATLY REDUCE MAINTENANCE COSTS.

Write today for LUBRIPLATE Data Book No. 1-52

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
Newark 5, N. J. Toledo 5, Ohio

DEALERS FROM COAST TO COAST—SEE YOUR CLASSIFIED TELEPHONE BOOK

BETTER LIGHT
for Machine Tools, Assembly and Inspection Benches

LOCALITES

The Finest of All Localized Lighting Units

MODEL 099-PX-412
Overall length 35½". Three instantly adjustable joints. Reflector accommodates 100 watt A-21 medium screw base lamp.

$13.28 EACH in pkg. of 4
Single Unit $16.60 ea.

Wired complete with keyless porcelain socket, toggle switch in base, and 6 ft. oil resistant cord 18/2 beyond base.

- All Wiring Fully Enclosed—completely protected from wear or insulation damage from oils and fumes
- Adjusta-tension Joints—tension easily adjusted for freedom of arm movement to suit worker and job
- Universal Base—mounts on outlet box or directly on machine or bench
- Baked Enamel Finish—exterior, Vista Green—Reflector interior, high temperature White

WRITE FOR COMPLETE CATALOG of Localite models with various type reflectors, arms and bases for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO
Localites are available through selected distributors everywhere.

LOCALITE fostoria
for Light ON the Job
Reg. U. S. Pat. Off.

Cut materials handling costs with MAGCOA Magnesium DOCKBOARDS

Magcoa Magnesium Dockboards are proving the perfect answer to freight car and truck loading problems in every type of industry. One man can position it without the aid of truck, chain or hoist because it weighs ¼ as much as steel ramps of equal size and strength. Hand holds in each corner of the special quarter round safety curb permits ease of handling.

Beveled edges and bend angle keeps Dockboard flush with floor and dock. Slipping out of position is impossible due to safety span designed to application requirements. Put completely modern Magcoa Dockboards to work for you . . . they'll take the load out of your carloading operations.

Representatives in All Principal Cities

DIVISION OFFICES
30 Rockefeller Plaza, New York 20
Russ Bldg., San Francisco 4
7657 Moline St., Houston
8922 W. 25th St. Los Angeles
8001 South Hampton Ave., Philadelphia
1025 Connecticut Ave., Washington D. C.

MAGNESIUM COMPANY of AMERICA East Chicago, Ind.

HOW TO PLAN YOUR PLANT MOVIES

Begins on page 294

audience, audience asks questions later; must proceed logically.

Colloquy. Leader—panel of experts (for authority of information)—panel of laymen (for bulk of discussion.)

Before you begin any type of forum activity, there are several preliminary steps to take:

1. Make sure everyone likes the forum method.
2. Guard against possible emotional by-paths of discussion.
3. Match sides evenly in controversial discussions.
4. Make sure your audience has somewhat similar experience and background.

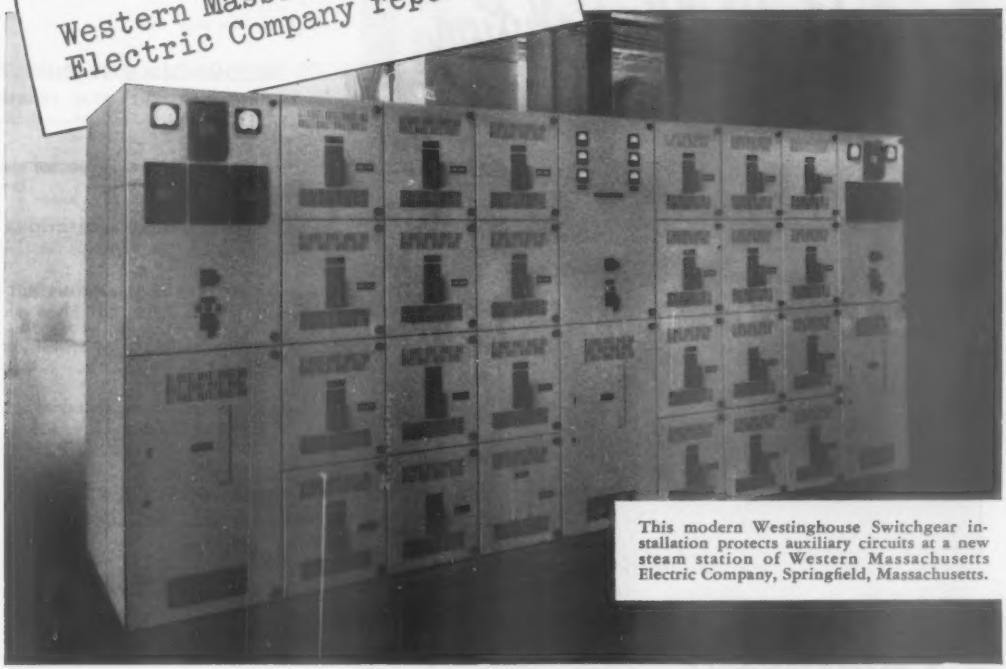
There may be special cases where the follow-up does no good, and may actually cause harmful effects. Some attitude-forming films and mechanical skill-training films are produced so as to demand no follow-up. Further discussion may tend to tire or confuse your audience. And repetitive, impact types of film presentation—strips of films shown over and over—ask little or no follow-up.

CHECK YOUR EFFECTIVENESS - Maybe you wasted your own and your workers' time. It's easy to find out. If your program was the informational type, you can give written tests. For attitude films, use special attitude surveys. But remember: Surveys should only be undertaken by properly trained personnel. Check skill-training film's effectiveness by studying production records and quality of work being done after the program. Careful observation may sometimes serve as an adequate check.

When the time comes for you to begin your training program, you'll want more information — especially names of films you need. You may also want to know more about training film techniques. So here's a list of catalogs, books, and booklets to help plan your plant movies:

Turn the page

Western Massachusetts Electric Company reports...



This modern Westinghouse Switchgear installation protects auxiliary circuits at a new steam station of Western Massachusetts Electric Company, Springfield, Massachusetts.

"COSTS LESS to apply... to install"

The experience of Western Massachusetts Electric Company demonstrates how Westinghouse Low-Voltage Switchgear helps to reduce power control costs. Specifically, they report:

Use of factory-assembled, low-voltage switchgear in connection with the supply to station auxiliaries on our West Springfield plant resulted in appreciable savings in two ways:

1. *Use of standard factory-assembled switchgear simplified installation and effected savings in installation costs.*
2. *Where switchgear is located adjacent to equipment being supplied, it was possible to use feeder breakers to control some of the large motors; thus, eliminating special motor control equipment.*

For central station services, industrial plants or large commercial buildings, Westinghouse Low-Voltage Switchgear offers you this same safe, low-cost means of protecting vital electrical services.

For complete information send for Booklet B-2296-D. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

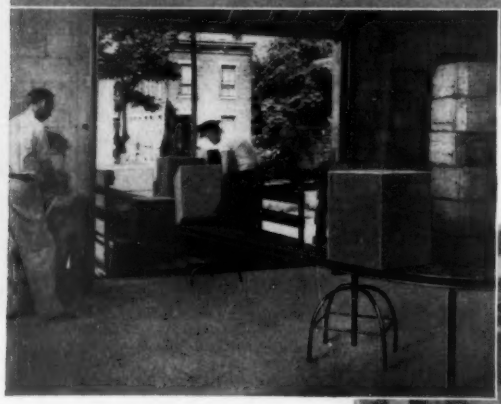
J-60754

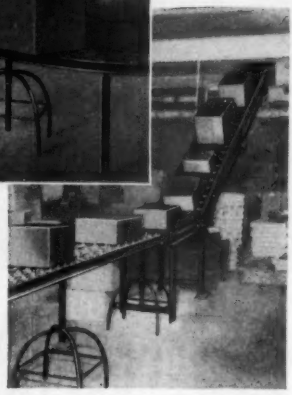
YOU CAN BE SURE... IF IT'S Westinghouse

LOW-VOLTAGE SWITCHGEAR

A Profitable Solution

for Processing Plant Handling





Buschman

"ROLL-OR-WHEEL"

Conveyors

Processing plants requiring many production line changes from product to product have found that BUSCHMAN Portable Roller or Wheel type Conveyors, attached to powered floor-to-floor Beltevators, reduce the cost of excessive handling—yield large returns on a very small investment.

The BUSCHMAN "Roll-or-Wheel" Conveyor is available in 10 ft. and 5 ft. straight sections, curves, stands, 3-way switches and other accessories. These units can be moved and reset in a matter of minutes.

Write for bulletin No. 15 today.

THE E. W. BUSCHMAN CO., INC.
4425 Clifton Ave., Cincinnati 32, Ohio

PRODUCE MORE ... FOR LESS on Buschman Conveyors

HOW TO PLAN YOUR PLANT MOVIES

Begins on page 294

RECOMMENDED READING

MANUAL FOR THE FILM FORUM LEADER. Charless Bushong. General Extension Division of Florida (1949)

THE FILM BOOK. Wm. H. Wilson and Kenneth B. Haas. Prentice-Hall, Inc., New York. (1950)

THE AUDIO-VISUAL PROJECTIONIST'S HANDBOOK. Business Screen, Chicago. (1947)

LEARNING THEORIES AND INSTRUCTIONAL FILM RESEARCH. Tech. Report SDC 269-7-6, Dept. of the Navy, Office of Naval Research, Special Devices Center, Port Washington, L. I., N. Y. (June 1949)

EFFECTIVE USE OF TRAINING FILMS. J. S. Livingstone and P. R. Ignatius. Harvard Business Review, Vol. 25, No. 4a (Autumn 1947)

FILM SOURCE CATALOGS

EDUCATIONAL FILM GUIDE. Compiled by Dorothy E. Cook and Katharine M. Holden. H. W. Wilson Co., New York. (1951 annual edition) Contains, a selected, classified list of 16mm. films.

TRAINING FILMS FOR INDUSTRY. Floyd E. Brooker. Final report on the war training program of the Division of Visual Aids for War Training. U. S. Office of Education Bulletin 1946, No. 13. Government Printing Office, Washington 25, D. C. 30¢. U. S. Office of Education films for industrial and vocational training.

INDEX OF TRAINING FILMS. Business Screen, 150 E. Superior St., Chicago 11, 25¢. 2000 industrial films and sources, classified by industries.

AUDIO-VISUAL MATERIALS IN INDUSTRIAL AND LABOR RELATIONS. J. J. Jehring. Limited number of copies available from the author at N. Y. State School of Industrial and Labor Relations, Ithaca, N. Y. Films, filmstrips, and recordings listed.

U. S. GOVERNMENT FILMS FOR SCHOOL AND INDUSTRY. 1951-52. United World Films, 1445 Park Ave., New York. 16mm. films and 35mm. filmstrips.

GUIDE TO MOTION PICTURES, SLIDE FILMS, AND RECORDINGS FOR IMPROVING HUMAN RELATIONS AND SUPERVISORY TECHNIQUES. Cheva Armor. (1950) Film Research Associates, Suite 1000, 1600 Broadway, New York 19. $1. Sources and brief descriptions.

NATIONAL DIRECTORY OF SAFETY FILMS. National Safety Council, 20 N. Wacker Drive, Chicago 25¢.

Turn the page

WHEN THE WORD COMES TO . .

STEP ON IT!

let Barrett SPEED your Roofing Jobs!

The urgency of America's defense program calls for a lot of speed on the part of American industry. And for a lot of new roofs, too! New roofs on new plants . . . and new roofs, or repairs, on old plants, as well.

Nearly 100 years of experience in meeting roofing demands of every kind have fitted Barrett to give you the world's longest-lasting built-up roof in the shortest possible time. For Barrett *speeds* your roofing jobs in 4 important ways.

1 **BARRETT SPEEDS** specifications. Ready at hand are Barrett time-tested, scientifically calculated application specifications for almost every built-up roofing problem. These are so foolproof that Barrett Specification* Roofs can be bonded for 20 years, and generally last much longer. Approved by the National Board of Fire Underwriters—Class A.

2 **BARRETT SPEEDS** deliveries. Strategically located supply points enable us to rush materials to your Barrett roofing contractor, and to your job when they are needed. Barrett does not have to rely on outside sources of supply for roofing pitch and felt. Because Barrett Specification* pitch and felt are made in our own factories, production can be controlled to meet demands. Your Barrett roofer can be sure that he will get the materials he wants when he needs them.

3 **BARRETT SPEEDS** application. The Barrett Roofer can be sure that roofing materials will be of uniform high quality. Application goes smoothly because there is no defective felt or pitch to interrupt and slow down operations. No time lost on the job!

4 **BARRETT SPEEDS** you the finest possible roof. Skilled workmen make for fast jobs. Barrett Approved Roofers have had many years of practical experience, plus well-trained manpower, plus Barrett engineering help, to assure you the finest possible roofing job in the shortest possible time.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
205 W. Wacker Drive, Chicago 6, Ill.
1327 Erie Street, Birmingham 8, Alabama
36th & Gray's Ferry Ave., Philadelphia 46, Pa.
In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal, P. Q.
Reg. U. S. Pat. Off.

Barrett Specification Roofs

But don't wait until you're up against it before ordering necessary roofing work. Call in a Barrett Approved Roofer today, or write us.

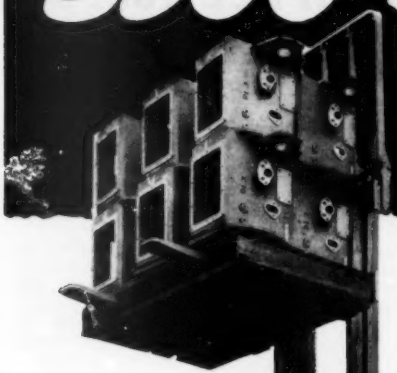
Now Available...the NEW

MOBILIFT

3500 Pounder

Lev-R-Matic DRIVE

Fork Lift Truck



Created to meet a demand!

...This is the Stand-Up Model "H-W" that MOBILIFT engineers developed to meet specific needs in all types of industry to help speed production and cut handling costs!

Not a single maneuverability feature or MOBILIFT advantage found in smaller models has been sacrificed in this new versatile "H-W" 3,500-lb. or "H" 3,000-lb. capacity truck.

CHECK THESE EXCLUSIVE FEATURES

- **LEV-R-MATIC CONTROLS** 2-way PUSH-PULL levers perform all jobs—Forward-Back, Elevating, Tilting. NO GEARS TO SHIFT
- **MOBIL-CHAIN LIFT** Roller chain operated uprights allow unobstructed forward view
- **MOBILIFT AIR COOLED 3-CYLINDER ENGINE** This heavy duty engine was designed and manufactured for exclusive use in MOBILIFT Fork Lift Trucks.

Stand-Up Model "H-W" 3,500-lb. cap. on 15" load center. Mast ht. 83" (Free Lift 56"; lift ht. 108"; mast ht. extended 136"). Outside turning radius 63⅞"; inside turning radius ZERO.

Illustrated:
Model "H-W" with 83" Mast.
Also available with Standard 63" Mast.
Model "H" 3,000-lb. cap. available with 63" and 83" Masts.

WRITE TODAY
for complete specifications on the new "H" series and other MOBILIFTS.

MOBILIFT Lev-R-Matic DRIVE

MOBILIFT CORPORATION

835 S. E. MAIN ST., PORTLAND 14, OREGON

2317 W. 18th, CHICAGO • 790 Patterson Ave., E. RUTHERFORD, N. J.
1113 Spring St. N. W., ATLANTA • 2724 Taylor St., DALLAS
2730 San Pablo Ave., BERKELEY

INDUSTRIAL FILMS

STEEL WITH A THOUSAND USES follows the planning and production of a simple casting, step by step. Charging, tapping, pouring, control, and other operations are shown. 16 mm., 38 min., sound color. Available free from:

Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York 20.

WHY PLAY LEAPFROG is the fourth in a series of Harding College economic education films. The 10-min. animated color movie tells the story of a worker in a doll factory, and explains basic facts about wages, prices, and productivity. Available from:

Harding College, Motion Picture Division, Searcy, Ark. For purchase, write: Harding College Special Services Office, 925 N. California St., Burbank, Calif. Price: $125.

STRAIGHT FROM THE HORSE'S MOUTH is a sound-slide film that tells how supervisors can get employees to do what management wants them to do. Material is based on field research. For sale at $69.50, which includes film and record, conference leader's outline, and 25 pamphlets. Write:

James F. Mathias, Sales Promotion Director, National Foremen's Institute, Inc., New London, Conn.

ECONOMY IS EVERYBODY'S BUSINESS teaches a lesson in materials conservation. The Army made the 12-min. film to urge personnel to cut waste; and industry can use it to do the same. Write:

Motion Picture Dept., National Assn. of Manufacturers, 14 W. 49th St., New York 20.

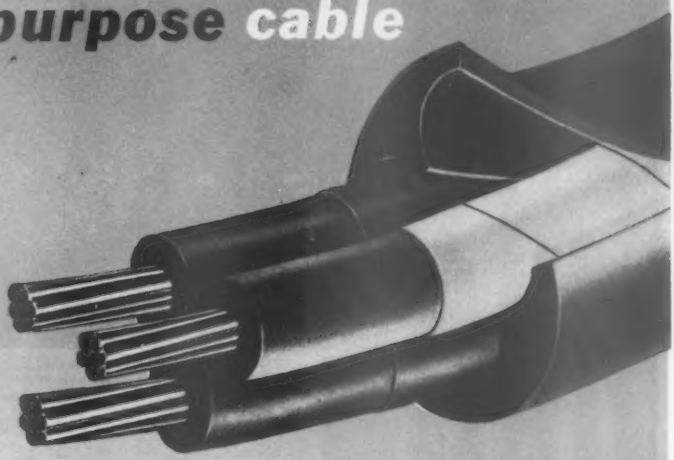
•

Do you have a film or films that might help management do a better job? Help employees learn their job faster, better? If so, tell us about it and we'll pass the information on to others.

Durasheath

the ***all-purpose*** *cable*

for both
power
and light
services



Durasheath's* tough neoprene jacket stubbornly resists electrolysis, corrosion, temperature extremes, cutting, abrasion, impact, flame, oil, grease, moisture and most soil acids and alkalies.

Run it overhead, in ducts, or buried underground—or all three in one continuous run.

It's flexible, easy to handle, economical to install; made in single or multi-conductor construction.

Your nearest Anaconda Sales Office or Distributor can show you why it's good business to install this versatile, all-purpose cable. Just ask them. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

52308

*Trademark

the right cable for the job

ANACONDA® WIRE AND CABLE

DEPENDABLE WIRING MEANS DEPENDABLE PERFORMANCE

This Ingersoll Duplex Horizontal Spindle Traveling Housing Milling Machine for rough and finish milling in one setting. It will produce either a 16 or 12 cylinder diesel crank case in 1.3 hours.

Rome Synthinol*

MACHINE TOOL and CONTROL WIRE

When rewiring of your machine tools is necessary, you will find Rome Synthinol Machine Tool and Control Wire the perfect answer . . . here's why.

Rome Synthinol is a specially developed polyvinyl chloride thermoplastic insulation that has proved its ability to withstand the abuse of high speed automatic operation in long, tough service. It is highly resistant to abrasion, flame, moisture, acids, oils and cutting solutions. It is available, solid or stranded, in a wide range of permanently clear colors. Its uniformly small diameters save valuable space.

Consistently high in quality, Rome Synthinol will give permanency and dependable performance to your electrical circuits. For the complete story, ask for Bulletin 101. The coupon below is for your convenience.

*T. M. Reg.

Underwriters' Laboratories approved as Type TW, with end use approval for 80° C. operation in air; 60° C. operation exposed to oil and in wet locations. Conforms to National Machine Tool Builders' Association Standards.

IT COSTS LESS TO BUY THE BEST

Copper wire mill products are a Controlled Material under N. P. A. Controlled Materials Plan . . . USE YOUR CMP ALLOTMENTS.

ROME CABLE CORPORATION, Dept. F-1, Rome, N. Y.

Please send me the Rome Synthinol Bulletin 101.

Name .....

Company .....

Address .....

City ..... Zone..... State.....

ROME CABLE
Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

ROME CABLE ROME, N.Y.

Since 1887

MILWAUKEE WROT WASHERS

Better WASHERS ... Competitively Priced

Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. *Submit your blueprints and quantity requirements for estimates.*

WROUGHT WASHER MANUFACTURING CO.

The World's Largest Producer of Washers

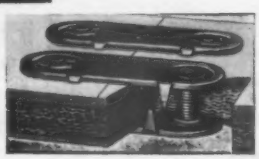
2259 S. BAY ST., MILWAUKEE 7, WIS.

FLEXCO®

BELT FASTENERS and RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
- ★ Distribute pull or tension uniformly.
- ★ Made of Steel, "Monel," "Everdur." Also "Promal" top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO., 4678 Lexington St., Chicago 44, Ill.

YOUNG OIL COOLERS

Save Waste Heat!

Young "OSH" Unit Oil Cooler

Here is the economical way to cool lube oil when water is at a premium or when waste heat can be used to warm room interiors. Young Unit Oil Coolers do double-duty . . . serve as heat exchangers and unit heaters.

Typical Young-quality design and construction include: a non-ferrous tube-and-fin core, one-piece cast iron headers, spring suspension of cooling core for free expansion and contraction, sturdy welded mounting brackets, etc.

These Young units cost no more than shell and tube bundle heat exchangers—can pay for themselves quickly in waste heat recovery.

SHELL AND TUBE BUNDLE LINE IS COMPACT, EFFICIENT

For your normal oil cooling requirements, you'll find Young shell and tube bundle heat exchangers are standardized for economy, precision-built for efficiency.

YOUNG

Heat Transfer Products for Automotive and Industrial Applications.

Heating, Cooling, and Air Conditioning Products for Home and Industry.

T. M. REG. U. S. PAT. OFF.

YOUNG RADIATOR COMPANY

Dept. 802-A, RACINE, WISCONSIN

Plants at Racine, Wisconsin and Mattoon, Illinois

YOUNG RADIATOR COMPANY
Dept. 802-A, Racine, Wis.

☐ Send me your catalog No. 3550 on Unit Oil Coolers.

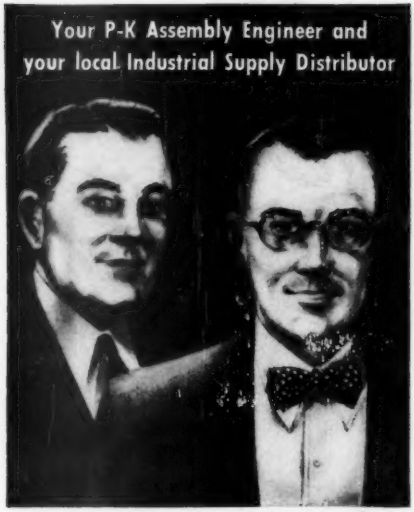
☐ Include Catalogs No. 1049 and 1149 on Shell and Tube Bundle Heat Exchangers.

Name_____

Company_____

Address_____

City_____ Zone____ State____



Teamed up to help you step up assemblies

Working side by side in every industrial center throughout the nation, this pair of experts is solving many difficult problems of planning and procurement.

The P-K Assembly Engineer is a fastening expert, fully qualified to help you plan faster, better, lower cost assemblies.

Your local Industrial Supply Distributor is an expert in procurement, with complete experience and facilities for simplifying your supply problems.

They can show you why Parker-Kalon Fastening Devices have made record savings in assembly time and cost in over a million applications.

Ask this top-notch team to sit in with your production staff. They'll give you the kind of help you need today more than ever. Parker-Kalon Corporation, 200 Varick Street, New York 14.

PARKER-KALON®

The Original **SELF-TAPPING SCREWS**

Cold-forged **SOCKET SCREWS**

AND OTHER FASTENING DEVICES

L-S "JACKSTACKER" TIERING TRUCK

Operates in LESS than 6 FT. AISLES!

QUICKLY • EASILY • SAFELY

AT LESS COST

HERE'S the

PERFECT TEAM

FOR MAXIMUM EFFICIENCY HANDLING PALLETIZED LOADS

L-S HYDRAULIC FOOT LIFT PALLET TRUCK

CAPACITIES up to 6000 lbs.

Multiple stroke, high 4" lift, forward lowering, constant wheel base. Fast, light-weight yet rugged, with maximum strength. Trouble-free. In your plant, or for hauling from elevators, freight cars, highway trucks —HP permits the "JACKSTACKER" truck to concentrate at stacking location, its maximum service point. HP is not only economical, but can be used in place of heavy fork trucks on short hauls.

THE L-S HYDRAULIC FOOTLIFT PALLET TRUCK

. . . whisks pallet loads out of freight cars, highway trucks, elevators — and hauls them to any convenient transfer spot.

THE L-S "JACKSTACKER" TRUCK

. . . picks up pallet load, enters aisle — then IN ONE TURN spots and stacks load ceiling high in AISLES less than 6' wide.

L-S "JACKSTACKER" TIERING TRUCK

CAPACITIES up to 6000 lbs.

5 BASIC MODELS — Telescopic, non-telescopic. All controls in handle head for convenience, maximum maneuverability, safety. Every operation can be performed with handle VERTICAL and in every other position. Articulated linkage insures full ramp clearance and unusual stability. All parts precision-designed and manufactured. No grease points. Minimum maintenance. Power drive unit replaceable in 20 minutes.

L-S Makes the Most Complete Line of Material Handling Equipment on Wheels

Write Today for Bulletins 24 and 26

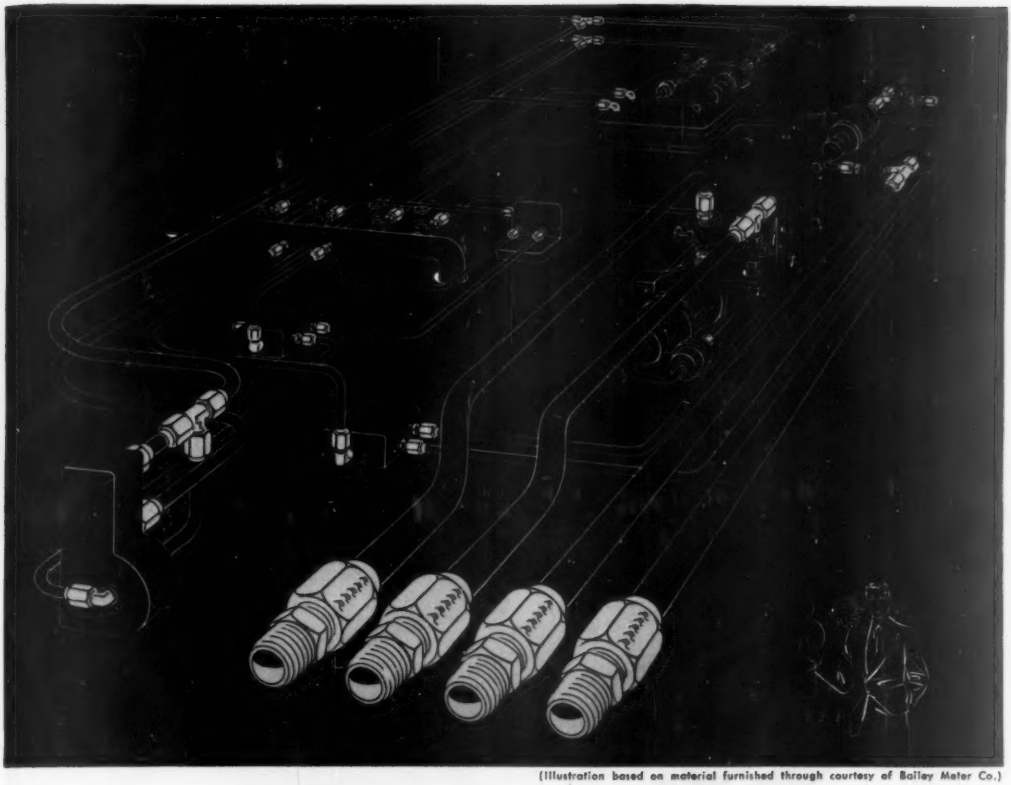
LEWIS-SHEPARD®

MULTIPLY MANPOWER · LEWIS-SHEPARD

The MASTER *Line*

LEWIS-SHEPARD PRODUCTS INC., 314 WALNUT ST., WATERTOWN 72, MASS.

Midwest Plant: CRAWFORDSVILLE, IND. • SALES-SERVICE IN PRINCIPAL CITIES • CONSULT YOUR YELLOW PHONE BOOK



(Illustration based on material furnished through courtesy of Bailey Meter Co.)

Tube it up...Forget it!

WITH PARKER TRIPLE-LOK FITTINGS

This does it

Triple-lok . . . 3-piece flare fitting famous for its sleeve . . . the easiest way to install tubing systems. Made in brass, steel, stainless steel, aluminum alloy.

Precision Mark of

Leakproof Tube Fittings

Take meter panels, for example, where delicate instruments, actuated by air, steam or other fluids, must register with optimum accuracy at all times. More and more manufacturers of precision instruments and panel boards are choosing PARKER Triple-lok Fittings to make their tubing systems *remain* leakproof throughout their long service life.

PARKER Triple-lok Fittings—as specified by the A.S.M.E. Code for Pressure Piping—are designed and precision made to be leakproof under even the severest conditions of vibration—elevated temperatures—high pressures—and repeated assembly...and to hold leakproof beyond tube bursting pressures. You will find PARKER Triple-lok Fittings not only on delicate instrument panels, but on all kinds of equipment where leakage in the tubing system would be too costly to be tolerated.

So tube it up and forget it . . . with Triple-lok Fittings. Ask your PARKER Distributor for PARKER Tube Fitting Catalog 4300, or write us direct. The PARKER Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

Parker
INDUSTRIAL TUBE FITTING
STOCKS CARRIED BY

AKRON	B. W. Rogers Co. P. O. Box 1030
BALTIMORE	Carey Machinery & Supply Co. 3501 Brehms Lane Whitehead Metal Products Co. 4300 E. Monument St.
BEAUMONT, Tex.	Standard Brass & Mfg. Co. 705 Milam St.
BOSTON	A. E. Borden Co., Inc. 176 Brookline Ave. Whitehead Metal Products Co. 281 Albany St.
BUFFALO	Whitehead Metal Products Co. 2128 Elmwood Ave.
CEDAR RAPIDS, Ia.	Globe Machinery & Supply Co. 309 8th Ave., S.E.
CHICAGO	Wallace Tube Co. 1300 Diversey Parkway
CINCINNATI	Williams & Co. 3231 Fredonia Ave.
CLEVELAND	W. M. Pattison Supply Co. 777 Rockwell Ave. Williams & Co. 3700 Perkins Ave.
COLUMBUS, O.	Williams & Co. 851 Williams Ave.
DALLAS	Metal Goods Corp. 6211 Cedar Springs Rd.
DAVENPORT, Ia.	Globe Machinery & Supply Co. 410 East Second St.
DENVER	Metal Goods Corp. 2425 Walnut St.
DES MOINES	Globe Machinery & Supply Co. East First & Court Ave.
DETROIT	J. N. Fauver Co. 49 West Hancock St.
HARRISON, N. J.	Whitehead Metal Products Co. 1000 South Fourth Ave.
HOUSTON	Metal Goods Corp. 711 Milby St.
INDIANAPOLIS	F. H. Langsenkamp Co. 229 E. South St.
KANSAS CITY, Mo.	Metal Goods Corp. 1300 Burlington Ave., N.
KNOXVILLE	Leinart Engineering Co. 412 E. 5th Ave.
LOS ANGELES	Haskel Engineering & Sup. Co. 721 W. Broadway, Glendale Metropolitan Supply Co. 353 East 2nd St.
LOUISVILLE	F. H. Langsenkamp Co. 339 W. Main St.
MEMPHIS	J. E. Dilworth Co. 730 South Third St.
MILWAUKEE	Morman Belting & Supply Co. 522 W. State St.
MINNEAPOLIS	Vincent Brass & Copper Co. 100 North 2nd St.
NEW ORLEANS	Metal Goods Corp. 432 Julia St.
NEWPORT NEWS, Va.	Noland Company 27th St. & Virginia Ave.
NEW YORK	Whitehead Metal Products Co. 303 West 10th St.
NORFOLK, Va.	R. W. Hudgins & Son 3 Commerce St.
PHILADELPHIA	Louis H. Hein Co. 15 West Lancaster Ave. Ardmore Whitehead Metal Products Co. 1955 Hunting Park Ave.
PITTSBURGH	Williams & Co. 901 Pennsylvania Ave.
PORTLAND, Ore.	Hydraulic Power Equipment Co. 2316 N. W. Savier St.
ROANOKE, Va.	Noland Company 11 Salem Ave.
SAN FRANCISCO	General Machinery & Sup. Co. 1346 Folsom St.
SEATTLE	Eagle Metals Co. 4755 First Avenue South
ST. LOUIS	Metal Goods Corp. 5239 Brown Ave.
SYRACUSE	Whitehead Metal Products Co. 207 West Taylor St.
TOLEDO	Williams & Co. 650 E. Woodruff Ave.
TULSA	Metal Goods Corp. 302 North Boston
EXPORT	Mercator Corp. 438 Walnut St. Reading, Pa.
CANADA	Railway & Power Engineering Corp. Ltd. Edmonton, Hamilton, Montreal, Toronto, Vancouver, Windsor, Winnipeg

LETTERS TO THE EDITOR

How You Can Make Your Desk Work for You

Dear Mr. Waddell:

I read the article entitled "How You Can Make Your Desk Work for You" in your September issue, and thought it very well done.

Enclosed is a photograph (shown above) of a most unusual and highly efficient desk. It is in the office of Jerome H. Stone, vice president of Stone Container Corp. (4200 W. 42nd Place, Chicago 32). This firm manufactures corrugated paperboard boxes.

The desk was custom-made and designed to fit the needs of left-handed Jerome Stone. You will notice that the telephones are on the right and drawers and filing cabinets are on the left. Thus, while talking to a customer, Mr. Stone can hold a phone in his right hand while writing or checking reports held in his left hand.

The desk-top file to his left contains compartments for each working day of the week. Notice that the desk is designed to serve also as a conference table. Mr. Stone is vice president in charge of sales and finds it very convenient to hold sales conferences right at his desk, in close proximity to sales reports and other factual material relating to the firm's sales.

LEE SEABOLT
ACCOUNT EXECUTIVE
LAWRENCE H. SELZ ORGANIZATION, INC., CHICAGO

•

Dear Sir,

Your article on desks touches a subject on which I am something of a "nut."

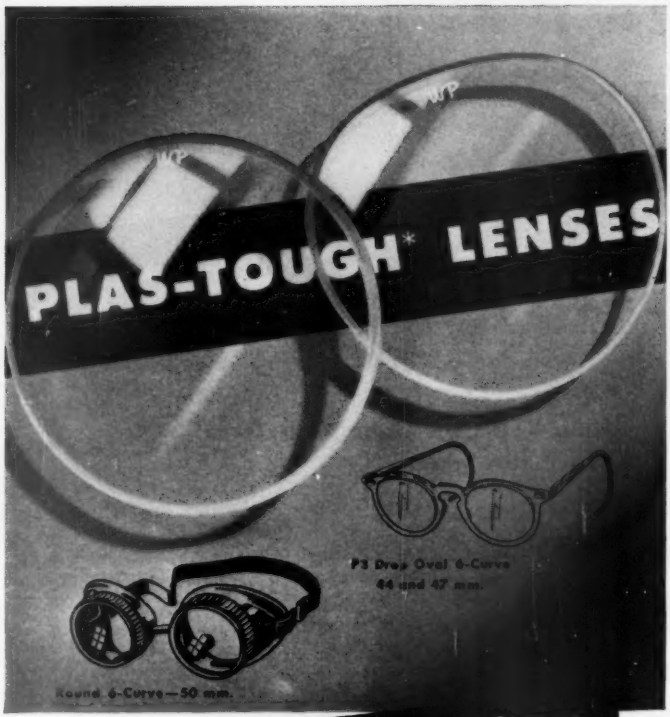
I would go beyond your British friend by eliminating entirely drawers that are big enough to hold anything but a check book, a diary, a slide rule, and such.

The so-called executive should not have any more papers around than he can reasonably dispose of in a day, and in most days he won't dispose of that many. All papers not disposed of should be marked for follow-up and filed by his secretary and brought up in the usual course. In this way, no papers will get lost.

Yours for less paper,

CARL V. WISNER, JR.
CHICAGO

New WILLSON®



Only Half the Weight of Glass Lenses

- Newly developed, extra tough plastic
- Meets existing Federal Specifications for impact resistance and light transmission
- Improved surface hardness gives unusual resistance to pitting, scratches, abrasion and common industrial acids that mar ordinary plastics
- Light weight gives greater wearing comfort

*Trade-Mark

See your WILLSON distributor or write us direct
WILLSON PRODUCTS, Inc., 218 Washington St., Reading, Pennsylvania
Dependable Products Since 1870

BEHIND THE BYLINE

Meet some of the men in industry who wrote articles for this issue of FACTORY.

GEORGE N. COLLINS handle plant maintenance and materials handling problems for Wallace Clark & Co., management consultants. He's had experience in plant operation, tells you how work planning and controls can improve maintenance (page 88).

HOWARD A. PILKEY has supervised training of millwrights (page 84) and many other training activities since he came to the Carborundum Co. five years ago. He's now manager of administrative and factory training.

SAMUEL M. DIX is an old hand at wage incentive installations. He's been with General Foods since 1948 as staff assistant to the chief industrial engineer. He discusses time study rating on page 124.

Turn the page

DEPENDABLE
under severest conditions of dust and dirt!

DODGE-TIMKEN

- Even under layers of grime, dirt and abrasive dust encountered in many production operations, the Dodge-Timken Type C bearing carries its power load smoothly, efficiently, without interruption—because it's
- Triple-sealed to prevent the entry of dust, however fine. Accurately machined steel seals keep dirt *out* and lubricant *in*.
- Dodge mounts, seals, houses Timken precision bearing units in rugged assemblies (four different types) to deliver a minimum of 30,000 hours uninterrupted service.
- Dodge Timken Type C Pillow Blocks are fully self-aligning, with both radial and thrust carrying capacity.
- Delivered fully assembled, adjusted and lubricated, ready to lock on shaft. Locking collars at both ends insure firm fastening.
- Normally available from Dodge Distributors' stocks, sizes from 1-7/16" to 4-15/16".

DODGE MANUFACTURING CORPORATION, 400 Union Street, Mishawaka, Indiana

DODGE

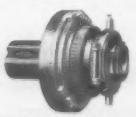
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor for assistance on new, cost-saving methods. Look for his name under "Power Transmission Equipment" in classified phone book.

FIRST IN POWER TRANSMISSION MACHINERY!

V-BELTS AND TAPER-LOCK SHEAVES

TORQUE-ARM SPEED REDUCERS



ROLLING GRIP AND DIAMOND B CLUTCHES

SOLID STEEL CONVEYOR PULLEYS

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO, ILLINOIS

It's a Hewitt-Robins

Maltese Cross®. . . as tough as they come

Wherever ore, rock, stone and other extremely heavy materials are handled on a continuous, mass-production scale, there's one *sure* way to get your money's worth in conveyor belting.

That's to install a Hewitt-Robins Maltese Cross belt. It's the toughest, ruggedest, strongest, longest-wearing belt that ever rode an idler . . . and with good reason.

We use special Hewitt-Robins-developed rubber compounds to give it resistance to abrasion, weathering, aging, heat and sun-checking. We reinforce the carcass with top quality cotton duck for maximum strength and minimum stretch—and we mildew-proof it thoroughly. We add layers of highly elastic skim rubber to absorb the impact shock of heavy loads . to make the belt flexible and true-troughing. And we top everything off with a tough-as-nails yet flexible cover that's permanently bonded to the carcass. *It all adds up to belting that's built to take the beating it will get!*

You get the same kind of "built-in" quality, the same extra wear, from Hewitt-Robins Monarch® Transmission Belting. All plies are straight-laid under uniform tension for longer flexing life and minimum stretch. No folds or seams, either . . . you can apply either side to the pulley . . . *actually double its active life!*

These two Hewitt-Robins belts make a great team in stone crushing plants, quarries, mines—wherever there's no time to *baby a belt.* Call your Hewitt Rubber Distributor (listed in the classified 'phone book), or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, New York.

HEWITT-ROBINS
INDUSTRIAL BELTING

HEWITT-ROBINS HR **INCORPORATED**

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS
CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS
FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS
RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS
TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

BEHIND THE BYLINE

Begins on page 310

ROBERT W. WOLCOTT is chairman of the board, Lukens Steel Co. He was president of the company from 1925 to 1949. During the last war he served on several committees of the War Production Board, and he's now one of the nation's top scrap experts (page 114).

J. W. ARMOUR is a 40-year man with International Harvester Co. He started out in 1910 as an employee in the product engineering department, became works manager in 1943, and is now manager of manufacturing research. He writes about salvage (page 116).

RICHARD E. NEUMAN is an industrial engineer with S. Goldberg & Sons. He's responsible for setting up in a small plant (page 92) the kind of maintenance control system that George N. Collins describes on page 88.

Turn the page

NOW! Industry's most famous electric drill is finer than ever!

NEW Black & Decker
1/4" Heavy-Duty
HOLGUN*
only $44.00

TRY THIS HUSKY HANDFUL OF POWER YOURSELF . . . TODAY!

WORLD'S LARGEST, MOST COMPLETE LINE

Let your nearby Black & Decker Distributor demonstrate this latest version of the most famous Drill in the electric tool industry! See for yourself how it will save you money, muscle and man-hours! See for yourself why experienced tool buyers hail it as a real champion! Or, write for full details to: THE BLACK & DECKER MFG. CO., 623 Pennsylvania Ave., Towson 4, Md.

Shipped Direct

Sturdi-bilt

Steel Work Benches

6

ALL IMPORTANT FEATURES

1. Warp-Proof Tops
2. Heavy Steel Frame
3. Tension Bolted
4. Feet—Adjustable for Uneven Floors
5. Use with or without Drawers
6. Completely "Furniture" Finished

Mass Production—Shipped Direct . . . Brings Cost Down!

America's greatest work bench values—made possible by mass production and direct-from-factory shipment. Exclusive Sturdi-Bilt structural features assure sturdy, long service under hardest usage. Has many uses—as work bench or table in production shops, assembly lines or shop offices. Now used in leading defense and industrial plants. (Names on request.) Preference given to priority orders—but special effort is made to ship all orders promptly.

Available in 2 Sizes Including 2 Drawers

Compressed Bonded Wood Top, size 23"x46¼" **$23.85***
Compressed Bonded Wood Top, size 28"x60" . . **28.85**

• Also available with Laminated Hard Rock Maple Tops in above two sizes. Prices upon request.

* All Prices F.O.B. Quincy, Ill.

MAIL COUPON

STURDI-BILT STEEL PRODUCTS, INC.
General Offices, 624 South Michigan Ave., Chicago 5, Illinois
Please rush me brochure giving complete details about STURDI-BILT Steel Work Benches.

Name_____Position_____
Company_____
Company address_____
City_____Zone____State_____

BEHIND THE BYLINE

Begins on page 310

ALEX M. LEWYT is president of the Lewyt Corp. and inventor of the vacuum cleaner bearing his name. He's active in all departments of his company. On page 98 he tells what the company uses in place of foreman merit ratings.

ROBERT BROOKS WYLAND developed several successful personnel programs for Industrial Tape Corp. One of them was measuring results of supervisory training (page 110). He's been with the company since 1948, is now assistant personnel director.

W. R. STEINBERGER has been in production control for 10 of the 22 years he's been with The Maytag Company. Since 1948, when he became production manager, he's put several slick materials handling ideas into practice (page 104).

Turn the page

Which do YOU need to protect YOUR business from FIRE?

Kidde Multi-Jet Nozzle. The "business end" of a Kidde CO_2 fire extinguishing system. It blankets flame with fire-smothering carbon dioxide.

Kidde Dry Chemical Wheeled Extinguisher. A "one man fire engine" to control large fires in flammable liquids, live electrical equipment.

Kidde "Heat Detector". 24 hours a day this sensitive detector stands guard ready to set off a Kidde CO_2 system automatically if fire should strike.

Kidde Carbon Dioxide Portable. Fast-acting...easy to use. A pull of the trigger releases a rolling fog of CO_2 gas that smothers flame instantly.

Kidde Smoke Detector. A new development in industrial fire fighting. Detects hidden smoldering fire, tells in which room or vault it is located.

Kidde CO_2 Hose Reel Equipment. Combines the convenience of a portable fire extinguisher with the great fire-killing power of a built-in system.

Kidde Trailer. An economical, fast-acting unit for thorough-going fire protection in smaller plants and airports and auxiliary protection in larger ones.

KiddeChemicalExtinguishers. Foam, Soda-acid or water portable extinguishers in stainless steel. Two-and-a-half gallon capacity. Easy to use, reliable, economical.

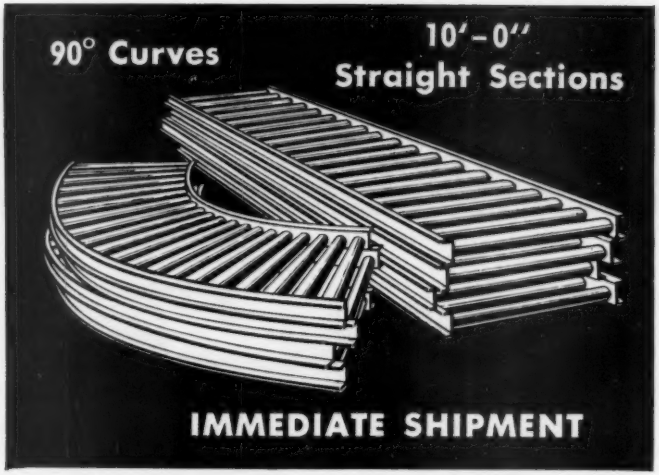
Kidde Vaporizing Liquid Extinguisher. Approved for fires in flammable liquids and electrical equipment. Discharges carbon tetrachloride.

For many years Walter Kidde & Company, Inc. has specialized in fire extinguishing equipment. It ranges from 2½ pound portables to huge built-in systems. Need advice on protection for your plant? Call or write Kidde.

Kidde

Walter Kidde & Company, Inc., 132 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

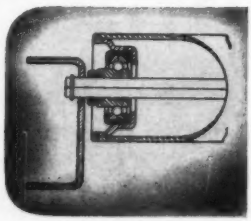


Stock ROLLER CONVEYOR

How many sections do you need? Offered in several sizes for average duty conveying. Roller spacing 4" or 6" centers. Roller lengths of 12", 16" and 20". Can be used with rolls set low and frame forms a guard rail. Both stationary and portable supports available. Write for literature.

FEATURES

ROLLER—2¼" O.D. No. 16 Ga. Welded Steel Tubing. Pressed Steel cup secured to tubing. Cap. 150 lbs.
SHAFT—7/16" Hexagon Cold Rolled Steel. Positively locked against rotation by hexagon holes in frame.
BEARING—No. 50. Slip fit in cup, easily removed and replaced. Protected position—set back from end of roll.
FRAME—3½" x 1¼" x 10 Ga. Pressed Steel Channel. With four 1-5/16" O.D. 13 Ga. Welded Tubing ties per 10'-0" section. Capacity 75 lbs. per foot with supports on 10'-0" centers and 380 lbs. per foot with supports on 5'-0" centers.
COUPLING—Furnished with bolted type for stationary service. Can furnish hook type for portable service if preferred.



DETAIL OF ROLLER

ALSO *Stock* WHEEL CONVEYORS
In both straight and curved sections. Ideal for portable use. Light-to-medium duty. Write for details.

Check your needs Today!

Logan Conveyors
LOGAN CO., 510 CABEL ST., LOUISVILLE, KY.

BEHIND THE BYLINE

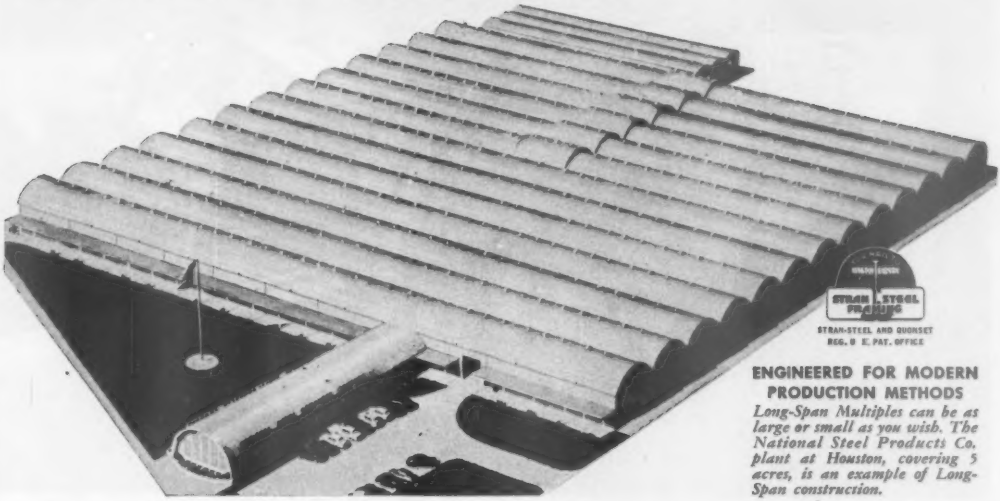
Begins on page 310

J. J. JEHRING is a specialist in getting ideas across to employees. He's an assistant professor at New York State School of Industrial & Labor Relations, where he's in charge of the audio-visual program. Tells you (page 294) how to get more out of your industrial films.

R. BERT SCHULTZE is just the man to tell you how to get more out of your equipment with equipment controls (page 106). He's been with Glenn Martin since 1938 and has recently been made chief of electronics tooling.

HOWARD ENGLER has come up through the ranks at Ryan Aeronautical Co. In 15 years he's gone from sheetmetal worker to superintendent in charge of fabrication. He tells how to boost your productivity on page 122.

FOR MODERN PRODUCTION



ENGINEERED FOR MODERN PRODUCTION METHODS

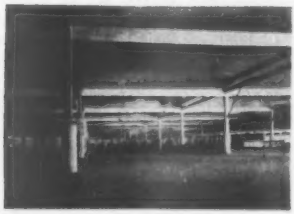
Long-Span Multiples can be as large or small as you wish. The National Steel Products Co. plant at Houston, covering 5 acres, is an example of Long-Span construction.

THE ALL-STEEL BUILDING INDUSTRY DEMANDS—

STRAIGHT SIDEWALL LONG-SPAN MULTIPLE

15′ OR 18′ CLEAR HEIGHT—40′ x 35′ BAYS

A NEW MEMBER OF THE QUONSET LINE
HIGHER—WIDER—PROVIDES ALL THE ROOM YOU NEED



BIG 40′ x 35′ 6″ BAYS give more clear-span area for space-consuming manufacturing or warehousing operations. 15′ or 18′ clear height under trusses permits heavy machinery or entrance of boxcars.

ANY ARRANGEMENT of windows or doors in end-walls or sidewalls is possible. Basic Long-Span Multiple is 70′ x 80′, can be lengthened or widened as desired.

Here's the building for America's industrial expansion—the new Long-Span Multiple. It's engineered to give you the most efficiency from modern industrial production methods.

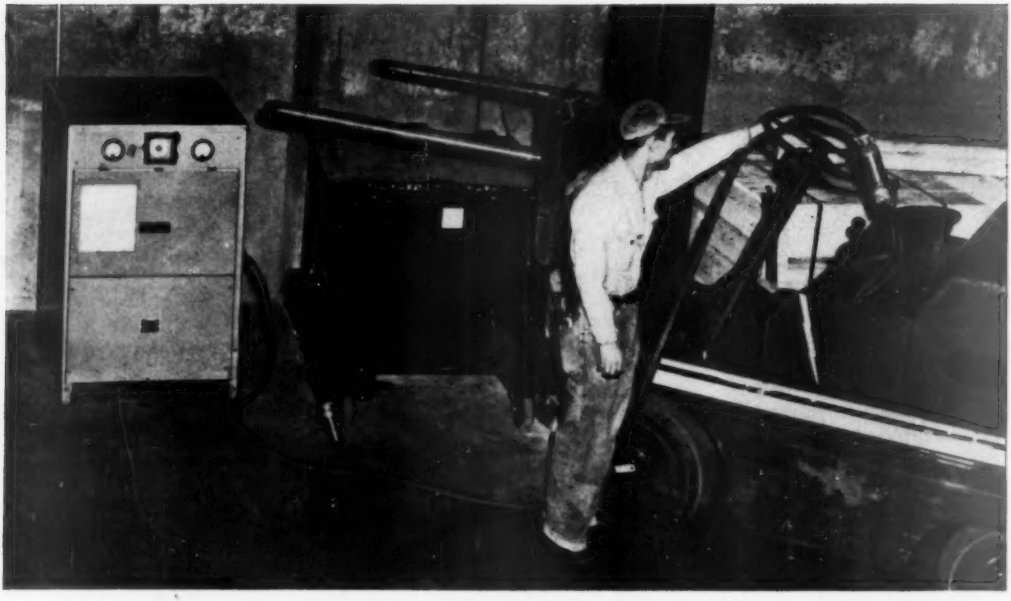
You get more room in the Long-Span Multiple. Its column spacing permits more unobstructed floor space—enough space for production and assembly lines, cranes, boilers, monorails, and complete palletization. The Long-Span Multiple is engineered to carry a modern monorail system.

Higher, wider, roomier . . . Long-Span Multiples are easily insulated. They are flexible enough to fit any size lot or use requirement. Ribbed and trussed with N-A-X HIGH-TENSILE steel for long life and economy, they go up in weeks instead of months.

The building that can answer your individual expansion problem is available now. Write, wire or phone for complete information.

GREAT LAKES STEEL CORPORATION
Stran-Steel Division **Ecorse, Detroit 29, Mich.**
NATIONAL STEEL CORPORATION

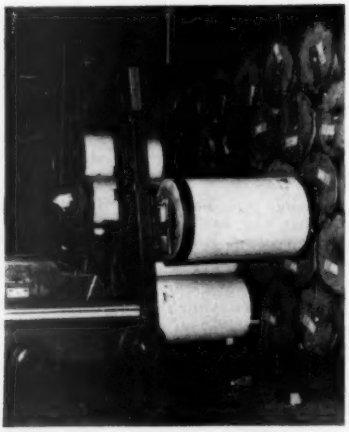
PRODUCER OF N-A-X HIGH-TENSILE STEELS



IN A FEW MINUTES G-E CHARGER IS CONNECTED TO BATTERY, TIME-SWITCH SET AND CHARGING IS DONE AUTOMATICALLY

Keep heavy-duty trucks on the job with G-E Copper-oxide Battery Chargers

PHILADELPHIA INQUIRER REPORTS FULL SATISFACTION AFTER THREE YEARS' USE



A TON AT A TIME is handled by double-fork-lift trucks in constant use at Philadelphia Inquirer.

Four conveniently located G-E copper-oxide battery chargers keep industrial trucks rolling at the famous Philadelphia Inquirer's publishing plant.

NO MAINTENANCE. After using these chargers for an average of three years apiece, the Inquirer reports their Maintenance Department is impressed by the little maintenance needed. Only an occasional dusting and an annual oiling of the cooling fan, the only moving part, are required.

SIMPLE OPERATION. "On the spot" charging is made possible because G-E copper-oxide chargers are easily placed in truck working areas. They are fully automatic. The user merely plugs in the charger, connects the battery and sets the time switch.

LOW COSTS. High efficiency keeps power costs down. Safety features prevent undue maintenance costs. For example, in case of a power failure, the battery will be disconnected from the charger and the charger will be disconnected from the line, both automatically.

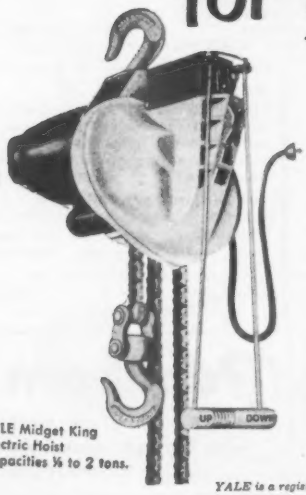
SERVICE AVAILABLE. If, however, service is required because of accident or other reason, it is quickly available at 29 strategically located G-E service shops.

Why not find out how G-E copper-oxide battery chargers can help you get faster materials handling at lower costs. Ask your truck agent, or write for Bulletin GEA-5292A, *Section 463-5, General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

463-5

There's a YALE hoist for *every* lifting job!



YALE Midget King Electric Hoist Capacities ½ to 2 tons.

• NOT ALL TREASURES are found in buried sea chests. Ask the men who have to do industry's heavy lifting—or pay the bills for it.

They'll tell you that when you've got a YALE hoist, you've got a *real treasure*—a money-and-muscle saver that's *exactly right* for your specific needs.

There's no need to compromise on a hoist that's "almost" right because YALE makes all types of hoists, all sizes, all capacities. You name it. YALE's got it!

Take the hoist shown here. For fast spotting of loads you just hang it up, plug it in and it's ready for easy, one-hand operation!

Your YALE distributor will help you select the hoist that will do more and save more for you. Call on him soon. Or write: The Yale & Towne Manufacturing Co., Dept. 31-A, Philadelphia, Pa.

YALE is a registered trade mark

YALE & TOWNE

LIGHT *as a*

TOUGH *as a*

CM

LIGHT WEIGHT—HEAVY DUTY

CYCLONE

96% Efficient
42% Fewer Parts
63% Less Weight

Sealed in Lifetime Lubrication

Alcoa Aluminum Alloy

HERC-ALLOY Flexible Load Chain

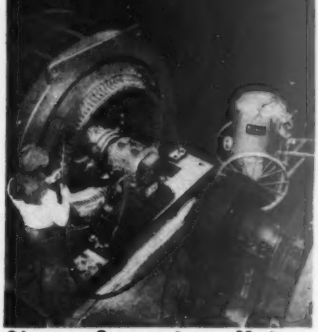
Picture this: a high speed chain hoist that weighs only 35 lbs. for the 1 ton capacity model. No more struggling with slow, ponderous, outmoded hoists. The Cyclone can be carried around with ease. Lifts loads rapidly with an easier pull on the chain. Can take the rough handling of maintenance crews or the continuous duty of production application. Workmen are grateful... do their work faster, safer and better when they have a Cyclone.

AVAILABLE IN capacities from ¼ to 10 ton.
For all the construction details write for Bulletin 145 C or phone your local distributor for a demonstration in your plant.

CHISHOLM-MOORE
HOIST CORPORATION
(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: New York, Chicago and Cleveland ★ Distributors Everywhere

PANGBORN AC-4
"CORN COB" Blast Machine



Cleans Generators, Motors

Faster Better Cheaper

Eliminates Toxic Hazard of Solvents.

THE new portable Pangborn AC-4 Blast Machine scours armatures, parts, frames, coils, etc. in ⅓ the time of other methods. Material costs are reduced 90% and toxic or explosive solvents are eliminated.

Look at the savings shown by this recent test on electric motors. (Name of Company on request.)

Cleaning Duplicate 300 hp Synchronous Motors		
	Material	Labor
Solvent Method	$55.00	120 hrs.
PANGBORN Method	5.00	40 hrs.
SAVING	50.00 (90.9%)	80 hrs. (66.7%)

Remarks: With Solvent, drying period took an additional 8 hours.

SIMPLE OPERATION
New Pangborn AC-4 Blast Machines use standard 40-pound air supply to remove oil and greases with blast of soft, 20-mesh corncob grits. No residue left on parts . . . no drying period.

FOR FULL INFORMATION, write today outlining your operation. Address: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

Pangborn
BLAST CLEANS CHEAPER with the right equipment for every job

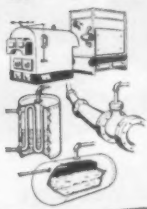
You're ahead 4 ways when you

SELECT SERVEL

AIR CONDITIONING EQUIPMENT

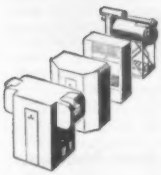
EXCLUSIVE ADVANTAGES OF SERVEL "ALL-YEAR" AIR CONDITIONING MAKE IT YOUR BEST BUY FOR TODAY—AND FOR THE YEARS AHEAD!

1 **Use existing steam lines to operate your Servel at low cost!**



Servel air conditioning units can be connected to your present source of steam to give you air conditioning at nominal cost. Servel "All-Year" Air Conditioners also operate on gas, oil, LP gas, waste heat, or steam from any source, at any pressure. With this multiplicity of fuels, Servel lets you use the most economical energy source.

2 **Servel has the model to do your job better!**

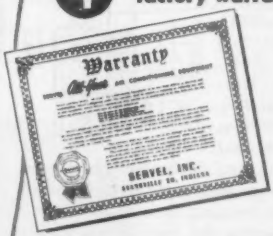


Do you have a problem in your plant that could be solved by the use of chilled water in one of your processes? Servel has the unit to remedy it! What do you want to air condition . . . a factory space, a store, an office? Servel has the unit or combination of units to provide economical air conditioning how and where you want it! You may have cooling only . . . a year 'round combination of heating and cooling . . . or combination units for vibration-free multiple floor air conditioning.

3 **Servel "no moving parts" design cuts maintenance costs!**

Operating on the famous absorption principle, Servel units deliver quiet, continuous, vibrationless operation at peak performance . . . year after year . . . and, because there is nothing in their cooling systems to wear out, require a minimum of maintenance! Operating within a vacuum—they are absolutely safe.

4 **Servel has a five year factory warranty!**



Servel's refrigeration unit is warranted for five full years! Five times as long as all other comparable air conditioning units.

SELECT SERVEL . . . the air conditioning that offers low operating costs, proven dependability, quiet, vibrationless operation—and an exclusive 5-year warranty!

SELECT SERVEL . . . the air conditioning that offers low operating costs, guaranteed dependability in home, commercial or industrial installations.

RESIDENTIAL COMMERCIAL INDUSTRIAL

Servel

AIR CONDITIONING

Made by the makers of the famous Servel Refrigerator

SERVEL, INC. • Evansville 20, Indiana

Write for the amazing cost-cutting facts about Servel Air Conditioning today!

Servel, Inc., Dept. FM-1, Evansville 20, Indiana

Gentlemen:

I'm interested in more information on Servel's new, low cost air conditioning. Rush me details on ( ) Industrial ( ) Commercial Air Conditioning.

Name _____

Firm _____

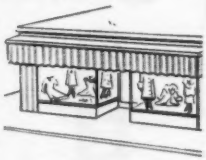
Address _____

City _____ *Zone* _____ *State* _____

NOW! SKYLIGHT WITH RESOLITE

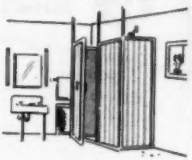
TRANSLUCENT STRUCTURAL PANELS

Resolite makes large skylight and wallight areas economical for corrugated industrial buildings because no special framing is required, either for support or weatherproofing — it nests with any standard corrugated sheet. Resolite permits substantial savings in plant lighting by its efficient diffusion of daylight through the building interior. Structurally rugged, chemically immune to weather extremes, and most industrial fumes, Resolite gives long life without protective treatment. Resolite is molded in standard sheet sizes and corrugations, made of polyester resins, reinforced with fiberglas mat — a quality product with controlled uniformity of thickness for strength and durability.



SPECIAL ARCHITECTURAL USES, TOO!

Resolite opens brand new vistas to the Architect, Builder and Interior Decorator. It answers the problem of what to use for colorful patio and portico covering, store front and bar facings, interior partitioning in homes, offices, corridors, shower stalls; for windows, skylight and decorative lighting panels, and limitless other uses where structural strength, light with privacy and decorative beauty are desired. Resolite is strong and rigid, yet light in weight, permitting lighter framing. It is shatterproof, avoiding the hazards of breakage. Resolite comes in a wide variety of colors, corrugations (including flat sheets) and surface finishes, providing endless possibilities in decorative effects. Carrying its own colorful surface finish, Resolite requires no treatment of any kind, and is easy to keep clean. Resolite is easy to use, requiring only ordinary tools and skills.

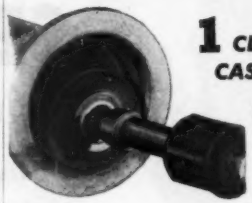


Write for free literature

RESOLITE CORPORATION

ZELIENOPLE, PA.

Pittsburgh Brushes Solved these Problems!

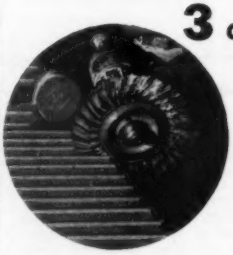


1 CLEANING RED-HOT CASTINGS in 30 seconds!

A Pittsburgh brush answered U. S. Pipe and Foundry's problem of cleaning red-hot castings. This rugged brush works 40 hours a week, turning out thoroughly cleaned castings at the rate of one every 30 seconds . . . a speed record for any brush cleaning operation of this type.

2 POLISHING 10,000 heating units!

When the Edwin L. Wiegand Company wanted to remove ragged edges from their *Chromalox* Heating Units economically and *fast*, they turned to rough, tough Pittsburgh Brushes for the answer. The 6" Pittsburgh steel wire brushes they installed polish 10,000 heating units during their life.



3 CLEANING WELDS in close quarters!

Allis-Chalmers' problem was to find a brush narrow enough to fit between cooling fins of transformer radiators, yet strong enough to remove slag and spall on welds which could conceal pressure-reducing pinholes. Pittsburgh engineers recommended an 8" rotary wire brush. Problem was solved!

Let Pittsburgh Engineers Solve Your Brush Problems.

Pittsburgh's complete line of brushes of every type, for every purpose, will provide a practical and economical solution of any brush problem you might have. Drop us a line on your company letterhead for a copy of our new booklet that shows, through actual case histories, how Pittsburgh can help cut your brushing operation costs. Address: PITTSBURGH PLATE GLASS COMPANY, *Brush Div.*, Dept. M-1, 3221 Frederick Ave., Baltimore 29, Maryland.

PITTSBURGH *Power Driven* BRUSHES

BRUSHES • PAINTS • GLASS • CHEMICALS • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

Are 10,000 pumps enough for you?

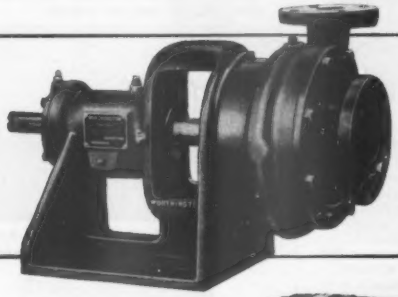
Just about. It takes that many different combinations to make sure that you—big user or small user—get exactly the right pump you need.

That's why we manufacture Worthington centrifugal pumps in over 10,000 standard combinations of capacities, heads, casings and mountings.

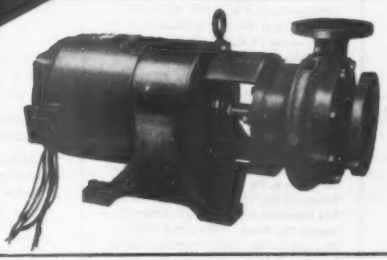
Types CN (frame-mounted) and DN (built-in motor) are made in capacities from 10 to 1800 gpm, heads to 535 ft., with 40 sizes of pump casings and 200 combinations of frame-mounted designs.

And—maximum interchangeability of parts!

Get the habit of asking for a Worthington—you'll get exactly the pump you want.



Type CN, frame-mounted, is a real "any-drive" pump—readily driven by electric motor, V-belt, or any other source of mechanical power.



Type DN in the famous Worthington Monobloc design—compact, streamlined, with built-in motor. On both types, liquid ends are interchangeable, and can be equipped with either conventional packing or mechanical seal.

WORTHINGTON

THE GOOD RIGHT HAND OF INDUSTRY

POWER TRANSMISSION: sheaves, V-belts, variable speed drives. **PUMPS:** centrifugal, power, rotary, steam. **AIR COMPRESSORS:** water-cooled, air-cooled. PC.0.0

The Fruit Was in a Sweat

. . . and So Was the Pump

They suddenly began having a hot time of it at a fruit and produce company near the Dillon Supply Company in Raleigh, N. C.

A centrifugal pump used in their refrigeration system had called it a day, and the temperature was rising in the rooms where the produce was kept. Without refrigeration, the perishables would have indeed perished.

But a frantic call to Dillon located, in the distributor's stock of Worthington centrifugal pumps, exactly the size needed. Prompt delivery . . . and not a lettuce leaf was allowed to wilt.

It's another example of the wisdom of depending on your Worthington Distributor. No distributor offers *more* pumps . . . no distributor offers more *value* in pumps . . . than a Worthington distributor.

Worthington Pump and Machinery Corp.
Pump and Compressor Merchandising Div.
Harrison, N. J.

Send latest bulletin on Worthington Centrifugal Pumps. Any other (type).....

Name.....

Company.....

Address.....

City.....State.....

SAVES YOU DAYS

WHEN YOU WANT

TOOLS FAST

When you need hand and bench tools *now*, delivery next month won't help much! To give you service *now*—as well as to help you with your year-around tool problems—Snap-on's 42 factory branch warehouses listed here put a selection of more than 4,000 tools at your elbow. The Snap-on branch near you is staffed with tool specialists—men who know how to help you save production and maintenance time and increase safety by using the right tools. Let us send you copies of the latest Snap-on Industrial and General Catalogs.

SNAP-ON SERVES INDUSTRY EVERYWHERE THROUGH THESE 42 FACTORY BRANCH WAREHOUSES

Albany 5, N. Y., 546 Clinton Ave.
Atlanta Ga., 380 Techwood Drive, N.W.
Baltimore 18, Md., 1209 E. 25th St.
Boston 35, Mass., 116 N. Beacon St.
Brooklyn 25, N. Y., 1649 Bedford Ave.
Buffalo 13, N. Y., 628 W. Utica St.
Charlotte 6, N. C., 915 S. Clarkson St.
Chicago 16, Ill., 2023 Michigan Ave.
Cincinnati 6, Ohio, 605 E. McMillan St.
Cleveland 15, Ohio, 2912 Euclid Ave.
Dallas 1, Texas, 2932 Commerce St.
Denver 3, Colo., 1050 Broadway
Detroit 2, Mich., 93 Piquette Ave.
Fargo, N. Dak., 421 N. P. Ave.
Houston 3, Texas, 1810 LeBranch St.
Indianapolis 2, Ind., 848 Fort Wayne Ave.
Jacksonville 6, Fla., 1602 Walnut St.
Kansas City 2, Mo., 3635 Main St.
Los Angeles 14, Calif., 1717 W. 6th St.
Milwaukee 3, Wis., 2600 W. State St.
Minneapolis 3, Minn., 1218 Harmon Place
Newark 6, N. J., 823 Sandford Ave.
New Orleans 13, La., 1040 Camp St.
New York 56, N. Y., 397 East 167th St.
Oklahoma City 3, Okla., 901 N. Hudson
Omaha 2, Nebr., 109 S. 24th St.
Philadelphia 30, Pa., 1710 Fairmount Ave.
Pittsburgh 8, Pa., 7007 Kelly St.
Richmond 20, Va., 1617 West Broad St.
San Francisco 2, Calif., 635 Golden Gate
Seattle 22, Wash., 1501 Olive Way
St. Louis 3, Mo., 2647 Washington Blvd.
Syracuse 3, N. Y., 323 Irving Ave.
Toledo 6, Ohio, 2932 Monroe St.

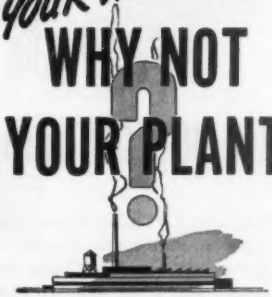
IN CANADA

Edmonton, Alberta, 10232 103rd St.
London, Ontario, 111 Mr. Pleasant Ave.
Moncton, N. B., 33 Mechanic St.
Montreal 15, Que., 751 Jean Talon St. W.
Regina, Sask., 2070 Albert St.
Toronto 17, Ont., 130 Laird Drive
Vancouver, B. C., 1043 Davie St.
Winnipeg, Manitoba, 238 Garry St.

SNAP-ON TOOLS CORPORATION
8044-A 28th Ave., Kenosha, Wis.

YOU SAFEGUARD YOUR VALUABLES

WHY NOT YOUR PLANT



Unfenced property invites vandalism and sabotage. Don't take chances in these dangerous days. Fence NOW and be safe. Surround your property with a Stewart Non-Climbable Chain Link Wire Fence. Also available for protective measures are Stewart Wire Window Guards, Steel Folding Gates, Wire Mesh Partitions and other products. Catalog No. 85, which contains complete information, will be sent on request.

Stewart 3TH Chain Link Wire Fence. Also available in 5TH (5 strands of barbed wire).

STEWART WIRE MESH PARTITIONS

Sectional with standard panels. May be arranged to fit any space. Ideal for locker rooms, toolrooms, storage rooms.

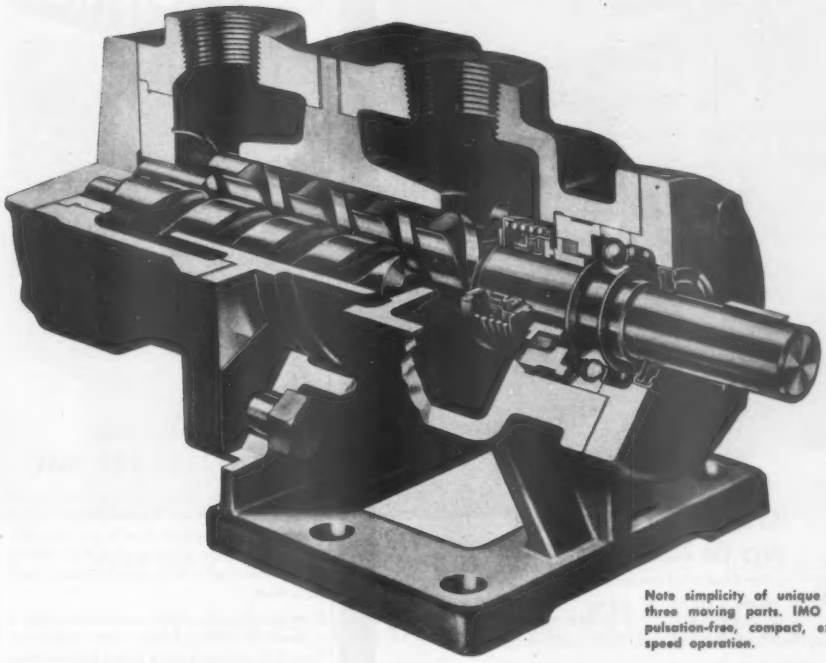
Other Stewart Products: Iron Picket Fence and Gates; Iron and Wire Window Guards; Sliding and Folding Steel Gates; Iron Railings; Steel Settees; Skylight and Machinery Guards; Bronze Plaques, and many others. When writing for information, please mention products in which you are especially interested.

Stewart maintains sales and erection service in all principal cities.

THE STEWART IRON WORKS CO., INC.
Stanley M. Stewart, President
1956 Stewart Block, Cincinnati 1, Ohio
"Fence Builders to America Since 1896"

Stewart IRON and WIRE FENCES

NOW...a new LOW-COST IMO for HIGHER pressures



Note simplicity of unique IMO design—only three moving parts. IMO is reliable, quiet, pulsation-free, compact, excellent for high-speed operation.

You've either heard about or used the proven De Laval—IMO A313A pump. Now De Laval brings you the A313B IMO for a wide variety of oil handling applications for higher pressures. This quality-designed, quantity-produced pump saves you up to 40% in initial cost over other IMO models for pressures up to 275 psi.

This new rotary positive displacement pump gives you all the advantages of the famous IMO pumping principle. Use it for capacities to 80 gpm, pressures to 275 psi and intermittent pressures to 325 psi... It handles light or viscous fluids in hydraulic systems, rotary and steam atomizing oil burners, lubrication, governing systems and similar services.

DE LAVAL OFFERS IMMEDIATE DELIVERY OF NEW IMO PUMP! WRITE TODAY!

DE LAVAL *IMO Pumps*

STANDARD PRODUCTS DIVISION

DE LAVAL STEAM TURBINE CO., TRENTON 2, NEW JERSEY

DL-124

How to cut loading time and reduce damage on carload shipments

"An investment in knowledge pays the best interest."
—Ben Franklin's Almanac, 1757

A major cost factor in shipping any product in carload lots is *handling*, and another is damage in transit.

Today many manufacturers have learned how to get big savings on both these items. They use Acme Unit-Load Band.

It does away with costly bracing materials... minimizes danger of damage . . . makes unloading safer, easier, quicker.

It's easy — unskilled loading crews quickly grasp the principle of Unit-Load, learn to use Acme Unit-Load tools.

It saves real money. For example, the Electric Storage Battery Company, Philadelphia, cut handling costs 65% on unloading and storing carload shipments of lumber.

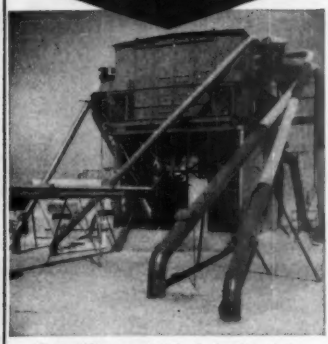
We look forward to the day when we can supply Acme Unit-Load Band to everybody who wants it, in the quantities they want. Meanwhile, why not get all the information you can about it? Ask your Acme Steel representative, or write Dept. FM-12.

ACME STEEL COMPANY
2840 Archer Avenue, Chicago 8, Illinois

ACME STEEL

Steel Strapping—Stitching Machines and Wire—Venetian Blind Slat Stock — Corrugated Fasteners — Strip Steel

SLY
Pioneers and Leaders in INDUSTRIAL DUST CONTROL



Sly Dust Filter on roof of the Quaker Oats plant at Akron, Ohio. Pipes shown carry dust-laden air from grinding apparatus to filter.

10 MILLION BREAKFASTS PER DAY!

That's the oatmeal output at the Akron Quaker Oats factory. Plus hundreds of tons of poultry and livestock feed a day, in addition to thousands of cases of puffed wheat, rice, hominy grits and Aunt Jemima pancake flour.

Dust from this gigantic operation created a nuisance to workers and plant neighbors. Then SLY engineers were asked to take over.

Through the installation of a 27,000 cfm Sly Dust Control System, all of the fine cereal dust is now collected by filtration through cloth. The entire unit is automatic in operation. An electric timer operates cleaning devices, which periodically shake the dust off the filter bags into hoppers, from which it is conveyed to a point of disposal. The system operates continuously.

The Quaker Oats project is typical of thousands of successful, inexpensive SLY installations which prolong the life of machinery, reduce cleaning and maintenance costs, and eliminate health hazards. *Ask for Bulletin 98 and tell us your problem so that we can write you fully.*

THE W. W. SLY MANUFACTURING CO.
4755 Train Avenue • Cleveland 2, Ohio
New York • Chicago • Philadelphia • Detroit
Buffalo • Cincinnati • St. Louis • Indianapolis
Birmingham • Los Angeles • Toronto.

You can't stop an elephant with a sling shot

You can't stop corrosion with ordinary paints . . .

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings . . . they can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic® Coatings can!

FIRST — Unlike maintenance paints, Bitumastic Protective Coatings are specially formulated from a coal-tar pitch base* that is, for all practical purposes, impervious to water. And when you keep moisture away from an exposed surface, you *stop* corrosion.

SECOND — Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements — a barrier that is impenetrable.

THIRD — Bitumastic Coatings provide up to 8 times the film thickness of conventional paint coatings.

FOURTH — Bitumastic Coatings stop corrosion caused by moisture—acid fumes — alkaline fumes — corrosive soil—salt air—heat.

**Hi-Heat Gray contains heat-resistant metallic base.*

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

SEND FOR SET OF FREE BOOKLETS!

Koppers Company, Inc.
Tar Products Division
Dept. 153-T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, your booklets on corrosion prevention.

Name.....

Address.....

City.....Zone...State.....

KOPPERS BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 153-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

How to measure a folding rule

Check every one of the features below before buying a folding rule. Then, compare a Stanley "Green End" with any other folding rule. See how much more real rule value there is in a rule that has "Green Ends". Famous Stanley "Zig-Zag", "Pull-Push" and Boxwood rules are available in a wide variety of styles, sizes and markings for every industrial need. Call your distributor.

No. 106 (6 ft.)

Easier Reading

Large black numerals and markings on white finish. Graduated in inches and 16ths on all edges for convenience.

Greater Accuracy

"Ball-socket" action locks joints, prevents "stretching or jack-knifing". Exceeds U. S. Govt. standards for accuracy.

Handy

Pocket-size. Opens as needed, up to 6'.

Longer Wearing

Rust-resistant nickel silver joints — longest wearing of any folding rule.
Protective plates on outside sticks.
New plastic coating on all sticks — wears four times longer.
Select rock maple sticks — tough and flexible.

Stanley Tools
New Britain, Conn.

Look for the famous "Green Ends" — your assurance of finest quality.

For inside or outside measuring . . .

No. 227 EXTENSION RULE 6 FT.

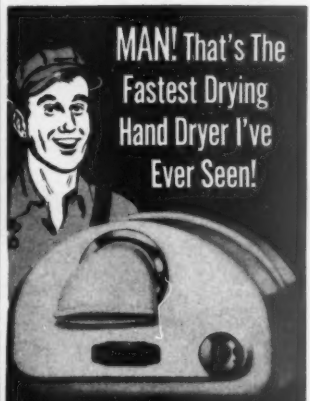
All the famous "Green End" features plus a 6" solid brass extension for quick, easy, inside or outside measuring. Extra thick sticks.

THE TOOL BOX OF THE WORLD

STANLEY

Reg. U.S. Pat. Off.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL



Saves Towel & Maintenance Expense, TOO!

NEW *Sani-Dri* Brings You Basic Improvements Never Before Possible!

Amazingly fast drying time — plus the advantage of cleaner, more sanitary washrooms — make the New Sani-Dri popular wherever it is installed.

Now you can be sure of providing fast, efficient hand drying service . . . and save continuing towel expense. Saves washroom maintenance costs too! No empty towel cabinets to fill. No unsanitary waste containers to empty or become a fire hazard.

The new Sani-Dri is available in two models — No. 8-SWA Hand dryer for washrooms; and No. 8-SWH Hair Dryer for Shower rooms, pools, etc. Both models are easily mounted to the wall and carry the Underwriter's Seal of Approval. Investigate this new faster-drying Sani-Dri today!

ONLY SANI-DRI ELECTRIC DRYERS GIVE YOU ALL THESE FEATURES

- New, improved heating element.
- Larger motor and blower than any other dryer.
- Instant Starting — Automatic Shut-off.
- New Circuit-Breaker Prevents Damage.
- Cast Contruction . . . Built to Give Years of Service.

Write for New Literature!

Send for new illustrated brochure and specification sheets.

Manufacturers of Stools, Table Bases and Cashmers for Restaurants and Soda Fountains.

Distributors in Principal Cities

THE CHICAGO HARDWARE FOUNDRY CO.

"Dependable Since 1897"

1112 COMMONWEALTH AVE., NORTH CHICAGO, ILLINOIS

if it's a handling problem . . . consult MERCURY

With over 41 years experience in the designing, manufacturing and installation of material handling equipment, MERCURY is well qualified to advise you on your individual handling problems. As the *only* manufacturer of all four types of equipment *i.e.* fork trucks . . . . platform lift trucks . . . . tractors, both gas and electric . . . . and industrial trailers, you are assured of *sound* as well as *unbiased* counsel.

FORK TRUCKS

"Jeep" Model-230 (illustrated) fork truck of 2000 lbs. capacity at 24" load center. Right angle stacks in 8-foot aisle with 32" pallet. Automotive steering, foot pedal acceleration, 130" fork elevation, full "free" lift.

"Yak" fork truck, capacity 4000 lbs. at 24" load center, is available in stand-up, center or rear control or sit-down designs. "Yank" stand-up center control fork truck is rated at 6000 lbs. capacity up to 30" load center.

ALL MERCURY fork trucks feature *simple, single cylinder, low pressure* hydraulic lift with patented cross suspension.

TRACTORS AND TRAILERS

"Tug" Electric Tractor (Illustrated): 3 models available – a 3 wheel light duty chassis and twin – 3 or 4 wheel medium or heavy duty chasses.

"Banty" Gas Tractor: A 3 wheel compact, short turning tractor which develops 2300 lbs. D.B.P.

Other MERCURY gas tractors are "Huskie," a heavy duty 4 wheel machine available with pneumatic or solid tires; and "Super-Huskie," a 6 wheel extra heavy duty pneumatic tired vehicle.

Trailers: Available in castor, 5th wheel steer or 4 wheel steer types. Capacities 2500 to 60,000 lbs.

PLATFORM LIFT TRUCKS

Illustrated is Model A-1020, wide design, 3 ton, low lift truck. Complete line includes narrow or wide models rated at 3000, 4000 or 6000 lbs. capacity with low, high or telescopic lift. Also, heavy duty, wide models rated at 10,000 lbs. with low or high lift.

MERCURY MANUFACTURING CO. 4110 S. Halsted St., Chicago 9, Ill.

MERCURY MANUFACTURING COMPANY
4110 So. Halsted St., Chicago 9, Illinois

☐ Have a representative call.

☐ Send copy of new 44 page catalog illustrating and describing complete MERCURY line.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

MORE THAN JUST A NEW MATERIALS HANDLING BOX

NESTIER®

IS A COMPLETE SYSTEM THAT SPEEDS THE FLOW OF SMALL PARTS FROM STOCK TO DOCK . . .

IT NESTS

NesTiers nest when empty to save space. Bails prevent complete telescoping, eliminate possibility of units jamming or sticking together.

SPECIFICATIONS					
No.	Ga.	Length	Width	Depth	Wght.
220	16	22⅛"	12½"	7¼"	15 lbs.
175	18	18⅛"	9⅛"	6⅛"	6 lbs.

Welded Heavy Gauge Steel, Baked Enamel Finish

IT TIERS

Bails lock units together to form a rigid stack. Parts in all units are visible and accessible from either end.

Designed by production engineers, the NesTier offers features found in no other box. It saves space—50 units can be nested in a five foot stack. It saves time—no need to transfer parts from one container to another. In tiered boxes, parts are visible and accessible.

IT STACKS IN RACKS, IT TRAVELS BY CONVEYOR, HAND TRUCK OR LIFT TRUCK

The NesTier can be easily carried, nested or tiered, by almost any means of transportation—even by hand.

Write for full details on NesTiers, NesTieracs, monorail carriers, trucks and dollies. Our service includes complete engineering advice on systematizing the handling of small parts in your plant.

METAL SPECIALTIES DIVISION of
THE CHAS. WM. DOEPKE MFG. CO. Inc.
ROSSMOYNE, OHIO

DETECTO SCALES

There's a precision-accurate Detecto Scale for your specific weighing and counting need. The Detecto helps increase production, yet assures you maximum accuracy by making slightest weight discrepancies immediately visible.

DETECTO-GRAM NEW PACKING SCALE

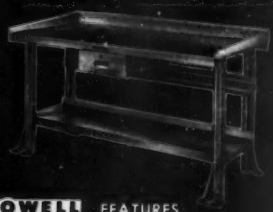
Another Detecto-Gram Scale for weighing your ingredients accurately. New Model #8800 brings to your heavy duty weighing jobs the mechanical accuracy previously found only in small scales. Capacity ¼ ounce to 60 lbs.

Write for Catalogue

DETECTO SCALES • INC.
MAKERS OF FINE SCALES SINCE 1900
541F PARK AVE. • BROOKLYN 5, N.Y.
SCALE ENGINEERS IN ALL PRINCIPAL CITIES

standardize with standard

HALLOWELL WORK BENCHES



OTHER HALLOWELL FEATURES

- Sturdy, rigid construction requires no bolting to the floor
- 4 lengths, 3 widths and 3 heights—all standard
- 3 top materials—steel, Presdwood on steel, and laminated wood
- Assemble them as single units or bolt them together to form a continuous bench of any length
- Functional design and neat appearance

Standardized work benches, with *standard* unit accessories, permit you to *custom build* your HALLOWELL Work Benches at a fraction of the cost of *building your own*. Write for descriptive literature. STANDARD PRESSED STEEL Co., Jenkintown 11, Pennsylvania.

HALLOWELL SHOP EQUIPMENT DIVISION
SPS
JENKINTOWN PENNSYLVANIA

GAS provides the absolute flame control essential to FIBERGLAS* production at OWENS-CORNING FIBERGLAS CORPORATION

Fiberglas*, product of Owens-Corning Fiberglas Corporation in Kansas City, Kansas, is used commonly for insulating Gas ranges, Gas refrigerators, buildings, automobiles, and wrapping Gas pipe lines. Produced as wool, textile yarns, packs and mats, Fiberglas is made by processes dependent upon the precise control of critical temperatures assured by the Modern Fuel of Industry—GAS.

Fiberglas starts as molten glass, made in 100-ton Gas-fired melting tanks. The Gas burners are sealed to provide precise control of flame temperatures, flame length, and luminosity. A luminous Gas flame is desired because the radiation effect heats glass at the tank bottom.

Molten glass, accurately held at 2200° F. by readily controlled Gas burners, is run through metal bushings to form the filaments which constitute Fiberglas. Gas-fired drying and curing ovens further process this versatile material.

Gas is the Modern Fuel of Industry—easy to control for precise temperatures, and easy to integrate into any production line. Wherever you need industrial heat, you can rely on GAS. Get the facts from your Gas Company Representative today.

** T. M. Reg. U.S. Pat. Off.*

MORE AND MORE...

THE TREND IS TO GAS

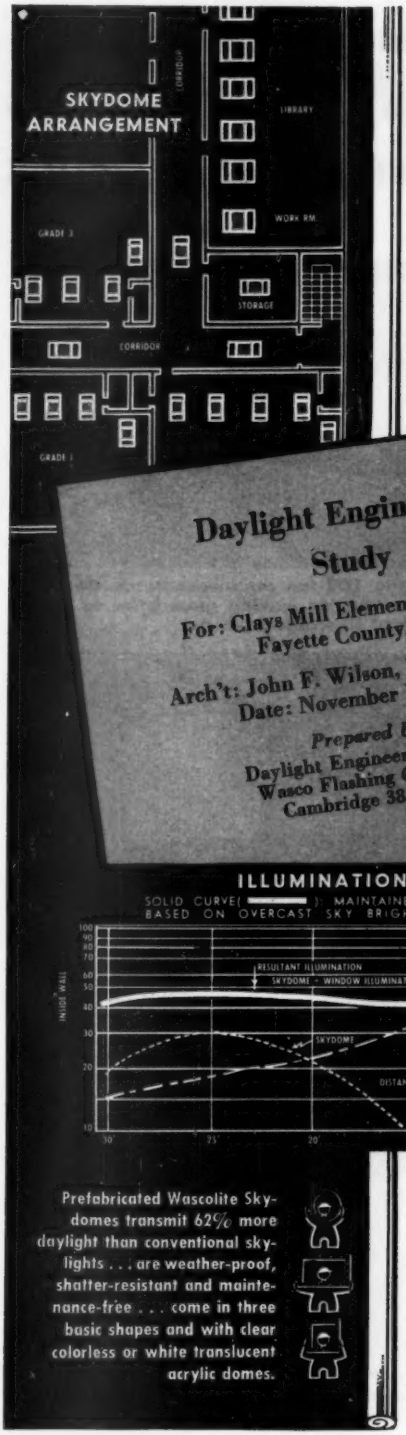
FOR INDUSTRIAL PROCESSING

AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK

One of the 100-ton continuous batch, Gas-fired melting tanks for making glass prior to manufacturing of Fiberglas products.

Two-zone, Gas-fired convection-type drying and curing oven, equipped with automatic temperature and safety controls.

Fiberglas Preformed Insulation, discharged from curing oven is cut to size at Owens-Corning's Kansas City Plant.


SKYDOME ARRANGEMENT
LIBRARY
WORK RM.
GRADE 3
STORAGE
CORRIDOR
GRADE 1
Daylight Engineering Study
For: Clays Mill Elementary School, Fayette County, Ky.
Arch't: John F. Wilson, Lexington, Ky.
Date: November 10, 1951
Prepared by
Daylight Engineering Dept.
Wasco Flashing Company
Cambridge 38, Mass.
ILLUMINATION LEVEL CHART
SOLID CURVE ( ) MAINTAINED ILLUMINATION IN FOOTCANDLES
BASED ON OVERCAST SKY BRIGHTNESS OF 1000 FOOTLAMBERTS
RESULTANT ILLUMINATION
SKYDOME + WINDOW ILLUMINATION
WINDOW
SKYDOME
INSIDE WALL
WINDOW WALL
DISTANCE FROM WINDOW
Prefabricated Wascolite Skydomes transmit 62% more daylight than conventional skylights . . . are weather-proof, shatter-resistant and maintenance-free . . . come in three basic shapes and with clear colorless or white translucent acrylic domes.

First Step to Better Daylighting:

A Wasco Daylight Engineering Study

A Wasco daylight engineering study of your building project is now available without cost or obligation. This study will show the correct number, size, type and spacing of Wascolite Skydomes . . . the illumination level maintained . . . other vital data. *Result:* superior daylighting at lower cost. Just send blueprint and illumination requirements; our daylight engineers will prepare recommendations promptly.

WASCOLITE PATENT PENDING **SKYDOMES®**

"62% More Light On The Subject"

WASCO FLASHING CO., 81 FAWCETT ST., CAMBRIDGE 38, MASS.

Use LAYKOLD asphaltic products for your maintenance work. All from one source, near you—in handy sized containers. All applied cold—no special equipment needed.

FOR ROOFS . . .

LAYKOLD FIBRECOAT—in Black, Red or Green. Mica-filled for long life. Meets Military Specif. MIL-R-3472. Apply with brush, mop or spray.

FOR FLOORS . . .

LAYKOLD TILE SET, WOOD BLOCK CEMENT, FLOOR MASTIC BINDER and STEP GRIP. Standards in industry for over 20 years.

FOR WALLS & INSULATION

LAYKOLD WATERPROOFING and WEATHERCOAT. Also Insulation Adhesive and LAYKOLD Cement for cold insulation repair.

ROADS & PARKING AREAS

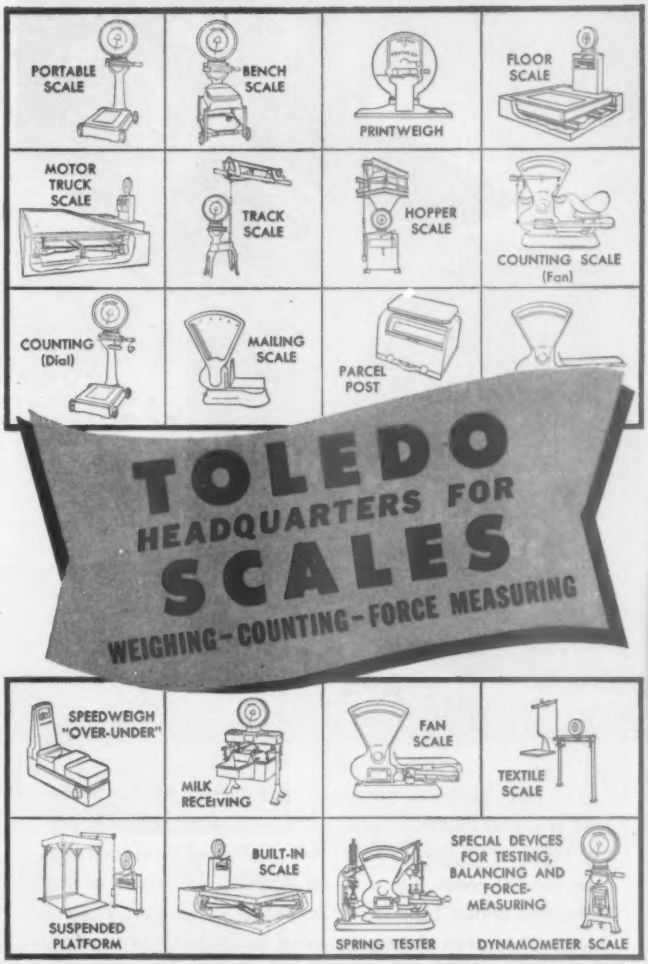
BITUMULS Emulsified Asphalt. Ideal for easy patching and sealing of paved areas.

Send for Illustrated Bulletins

AMERICAN Bitumuls & Asphalt COMPANY

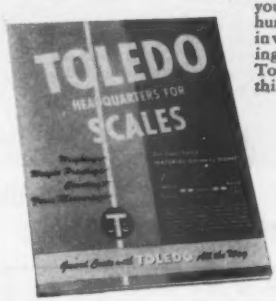
200 BUSH ST., SAN FRANCISCO 4, CALIF.

Providence 14, R. I. Perth Amboy, N. J. Baltimore 3, Md. Columbus 15, Ohio, Mobile, Ala. Tucson, Ariz. Seattle, Wash. St. Louis 17, Mo. Baton Rouge 2, La. Inglewood, Calif. Oakland 1, Calif. Portland 7, Ore. Washington 6, D. C. San Juan 23, P. R.



MATERIAL becomes MONEY on your SCALES!

Errors made at the scale stay wrong forever. There is no chance to recheck; either the material has been shipped or has lost its identity in the general stock. You've got to be *right!* Why not review your entire scale situation *now?* Have you up-to-date scales—or the *right* scales? Have you enough scales to cover all steps in materials handling? Do you need Printweigh to stop losses through human errors? Do you have special problems in weighing, checking, testing, counting, batching or force-measuring . . . there's a modern Toledo to do a better job for you. Send for this new weight control bulletin 2020-d.



Toledo Scale Company, Toledo 1, Ohio

Please send me bulletin 2020-d showing modern applications of Weight Control.

Name_____

Company_____

Address_____

City_____ State_____

F-1

This "2 strips — not 6" idea is saving important sealing labor in shipping rooms from coast to coast.

Because Snake Tape is reinforced, two strips alone give strap-like strength to cartons. Users report: "Damage claims due to tape failure are unknown."

Isn't it time to try Snake Tape on *your* cartons? We will gladly mail more facts and a 20-yard test sample at our expense. Send your request now to Angier Corporation, Framingham 1, Mass.

Sturdy cords are imbedded in waterproofing material between two layers of selected kraft. Best animal glue assures a perfect seal. 6 *WIDTHS* in 100-yd. rolls. Easily dispensed by almost any "cut-off" type machine.

(*Left*) SNAKE TAPE also gives unexcelled protection to products that "get it in the end." (Photo, courtesy Sloane-Blabon Corp., maker of quality linoleum products.)

Angier

Industrial Protective Papers Since 1895

Distributors in Principal Cities

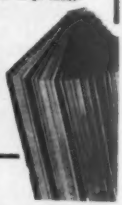
LET SNAKE TAPE BE YOUR ANSWER TO NPA ORDER M-59

This order, effective May 1, 1951, limits the use of steel strapping. We suggest that you carefully review this order and investigate the merits of Snake Tape as the answer to new closure problems.

TOP MANAGEMENT ORGANIZATION AND CONTROL

Just Published

1. **Shows organization at topmost levels and the control practices of a number of large industrial concerns.** Based on an extensive survey made by the authors. Covers operating and staff organization; policy control; inventory techniques; quality control; personnel policies; production and cost control; product development and research; etc. **By Paul E. Holden, Prof. of Indus. Mgt., Lounsbury S. Fish and Hubert L. Smith, Res. Assocs.; all of Stanford Univ. 257 pages. $5.00**



SMALL PLANT MANAGEMENT

2. **Tells how to organize, operate and supervise the small plant to secure a maximum of production at a minimum cost per unit.** Treats every significant management topic including considerations in financial planning, laws to consider in production, sales tools and their use, building employee morale, know-how rules of machine planning, controlling manufacturing expenses, etc. **Edward H. Hempel, Editor, Chairman, Small Plant Committee, ASME. 499 pages, 45 illus., $6.00**

THE ART OF ADMINISTRATION

3. **Shows the WHAT, WHY and HOW of administrative work in relation to leadership,** personal power, authority, and coordination in top management. Covers the fundamental aims and purposes of large organizations; the characteristics of human nature in action; administration's part in democratic leadership and its education function; and the personal aspects of administration which are effective in achieving collective cooperation. **By Ordway Tead, Author of "The Art of Leadership." 223 pages, $3.75**

QUALITY-CONTROL HANDBOOK

Just Published

4. **A reference of industrial know-how on the fundamentals and means of achieving better product quality at lower cost.** Use it for basic or advanced review of all phases, not only the statistical, of the quality-control function—for quick reference to many formulas, data, record forms, and other practical information. Covers economics of quality control; organization for quality; acceptance control and assurance of quality; application to specific processes and products. Every section the work of specialists. **Edited by J. M. Juran, Consulting Management Engineer. 708 pages, 176 illus., $10.00 (payable on terms).**

SEE THESE BOOKS 10 DAYS FREE

McGraw-Hill Book Co., Inc., 330 W. 42 St., NYC 36

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents for delivery, and return unwanted book(s) postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

- ☐ 1. Holden—**TOP MGT. ORGAN. & CONTROL** $5.00
- ☐ 2. ASME—**SMALL PLANT MANAGEMENT** $6.00
- ☐ 3. Tead—**THE ART OF ADMINISTRATION** $3.75
- ☐ 4. Juran—**QUALITY-CONTROL HANDBOOK** $10.00; payable $2 in 10 da., $4.00 mo.

(Print)

Name .....

Address .....

City ..... Zone ..... State .....

Company .....

Position Fac-1

This offer applies to U.S. only.

Panel discussions on how casters help reduce the **"Reducible 30%"***

MATERIALS-HANDLING FORUM

Write us how you've used casters to solve specific handling problems. $25.00 will be paid for material used.

A SERIES PUBLISHED BY BASSICK, WORLD'S LARGEST MANUFACTURER OF CASTERS AND FLOOR PROTECTION EQUIPMENT

STRAIGHT-LINE EFFICIENCY COMBINED WITH FLEXIBILITY IN MODERN ASSEMBLY METHOD

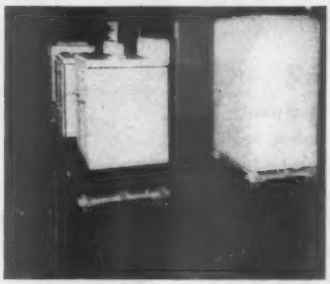
Standard swivel and rigid casters with special wheels having a V-groove section cut in the tread for operation on track are basic to one of the most important materials-handling improvements of recent years, developed by Bassick.

First used by the aircraft industry in World War II, this method of speeding production and cutting costs has spread to the manufacture of automobile trucks, heavy-duty axles, bombs, machinery, food processing, and many other industries.

Grooved-wheels more practical than flanged wheels

Besides being more economical, they can be used on or off the track.

The track system is extremely flexible, can be easily and inexpensively changed at any time or completely removed.



TRACK LAYOUTS CAN HANDLE EVERY OPERATING CONDITION

They can be easily and inexpensively re-arranged to handle simple or complex operations, using curves, switches, guide rails, etc. Fixtures, dollies, trucks, assembly stands, equipped with Bassick Position Locks, may be easily locked in one position or instantly released for movement.

Method ideal for loads of every weight

Various types of Bassick Casters are available with 4 in., 6 in., 8 in., 10 in. grooved wheels to handle loads up to 10,000 lbs. per caster.

Inverted angle iron track important element

Bassick Grooved-Wheel Casters operate on self-cleaning angle iron track, which is low cost, easily installed and can be laid wherever desired to utilize available working space to best advantage, without the restrictions of other conveying systems.

MAIN ADVANTAGES OF GROOVED-WHEEL ANGLE-TRACK METHOD

It controls movement by keeping all handling equipment in line in fixed position, and it makes movement 3-to-1 easier than flat wheels in direct contact with the floor.

Full details available upon request

Write for Bassick booklet CW-49. Phone your local Bassick distributor. He'll be glad to help you and arrange for engineering assistance when desired. THE BASSICK COMPANY, Bridgeport 2, Conn. *In Canada:* Belleville, Ont.

*According to cost analysts, materials-handling (about 30% of total cost) affords about the only real opportunities for cost reduction today.

Bassick — STEWART SW WARNER

MAKING MORE KINDS OF CASTERS — MAKING CASTERS DO MORE

There Ought to be a LAW...

and there IS!

Over the years eye injury costs at your plant will follow the LAW OF AVERAGES unless an adequate eye protection program is installed.

Eye injuries cost industry more than $5 per employed worker per year with compensation averaging nearly $400* per injured man. (If *your* company's eye accident costs have been less, without a formal eye protection program, you have been fortunate —*so far.*) Eye accidents also cost $5 in lost productive time every second the clock ticks—time you, your customers and the nation can ill afford.

Put a comfortable AO Safety Goggle on every exposed worker and you *can prevent* 98% of these accidents at very little cost. Act *today*—it may be later than you think. Ask the AO Safety Products Representative in your area to call with facts and figures.

*Estimate

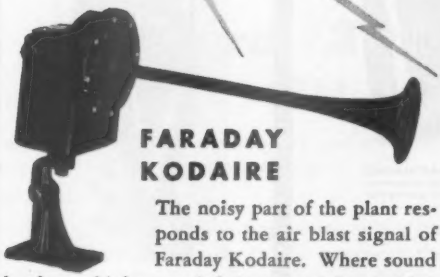
American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

SOFT

...or LOUD

Signals do the directing...



FARADAY KODAIRE

The noisy part of the plant responds to the air blast signal of Faraday Kodaire. Where sound levels are high or varied, it commands attention with a high powered trumpet blast—perfect for mills, foundries, industrial plants, either inside or outside. Try it on your next new or replacement job.

...OR BUZZERS

Where noise levels may not be quite so varied or loud, the Faraday Buzzer is a perfect signal. It provides a sharp buzzer tone at high frequency which can be easily increased or decreased by a simple screw adjustment. Fits Uni-Pact adapter plate and can be incorporated into the famous Faraday Unipact system. Write for Sperti Faraday Signal Catalog.

Sperti Faraday Inc.

ADRIAN, MICHIGAN

BELLS • BUZZERS • HORNS • CHIMES • VISUAL AND AUDIBLE PAGING DEVICES AND SYSTEMS

"Quit cussing about pipe repairs and replacements —and DO SOMETHING!

install corrosion resistant

SARAN LINED steel pipe

Right now is the time to act! Cut pipe repairs and replacements! Specify corrosion-resistant saran lined steel pipe! You'll find, as have many of the country's leading manufacturers, that this remarkable pipe means dependable long term operation at a minimum maintenance cost. Saran's unusual resistance to most chemicals and solvents plays an important part in the reduction of shutdowns due to pipe repairs and replacements. Another noteworthy advantage is its ease of field fabrication involving NO costly delays with special tools or handling.

These advantages are all important to you, so "quit cussing and do something." For detailed information mail this coupon to the Saran Lined Pipe Co. *Saran lined steel pipe is manufactured by The Dow Chemical Company.*

Distributed by

Saran Lined Pipe COMPANY

2415 BURDETTE AVE., FERNDALE, MICH.
With Offices in: New York • Boston Philadelphia • Pittsburgh • Chicago Tulsa • Portland • Indianapolis • San Francisco • Houston • Denver • Seattle Los Angeles • Cleveland • Charleston, S. C. • Toronto

send today!

Please send me a copy of your catalog on Saran Lined Pipe, Valves and Fittings.

Name_____

Title_____

Company_____

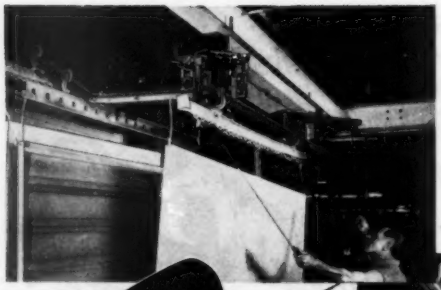
Address_____

City_____

State_____

SP-28

SARAN LINED PIPE a DOW product



Carriers roll off power conveyor in finishing oven to crosstrack switches for 90° transfer to shipping area.

Carriers descend through degreasing tank on power-operated chain conveyor

Solenoid operated switch automatically brings trolleys on parallel tracks into single track alignment.

A well-known metal partition manufacturer faced the problem of increasing production without enlarging building. New and better handling methods were obviously needed. They chose an American MonoRail overhead handling system as the best answer to increase capacity without increasing space and with less handling labor. Now, this American MonoRail system handles the steel components from receipt of raw materials, through finishing to shipping. The system boosted production, cut handling labor, improved space utilization, reduced material damage, bettered working conditions, and improved production control.

Let an American MonoRail engineer show you how it can be done in your plant.

THE AMERICAN MONORAIL COMPANY

13114 ATHENS AVENUE • CLEVELAND 7, OHIO

IS YOUR SWITCHBOARD *OVERLOADED?*

HERE'S A QUICK AND ECONOMICAL SOLUTION

WHEELER

Self Powered

ELECTRIC

TELEPHONES

- Easily, quickly installed at constantly called locations.
- No batteries; no outside power source. Rings like ordinary telephone. Clear, undistorted speech.
- Built to standard telephone specifications for day-in, day-out service, yet costs less than many intercoms.
- Very low current, hence no spark hazard.
- Available as self-contained handsets . . . station to station intercom (up to 12 stations) . . . with bell or visual signal, also with relay for operating standard gongs, horns, lights.

Write for further details. Or contact Allied Radio or your nearest G. E. Supply, Westinghouse or Electrical Jobber.

THE **WHEELER**
INSULATED WIRE CO., Inc.
Division of the Sperry Corp.
1110 EAST AURORA ST.
WATERBURY 20, CONN.

TUBE SWELLING WILL NEVER KILL THIS HOSE

*Concord #20**

STEAM HOSE

Here's the steam hose that gives you the exclusive protection of a tough inner lining of stainless steel wire braid.

Actually, this durable lining represents a built-in *extra life.* Because it absolutely prevents the old steam hose bugaboo of tube swelling under continuous high pressure . . . assures permanent retention of original inside hose diameter . . . does away with swelling and constriction of tube . . . assures full flow of steam always . . . facilitates trouble-free recoupling.

What's more, CONCORD #20 construction includes: two or three braids (depending on size) of alternate high tensile steel wire and rubber layers firmly bonded over outside of tube for maximum burst-protection and safety. An asbestos braid provides positive cover adhesion and serves as cover insulator. A rugged, abrasion-resistant cover withstands severest abuse.

For the best service — under even the worst conditions — get CONCORD #20 Steam Hose. Get in touch with your nearest BWH distributor today for a demonstration or write us direct.

SPECIAL STAINLESS STEEL INNER WIRE BRAID PREVENTS TUBE SWELLING . . . PREVENTS PRESSURE LOSS . . . ADDS LIFE.

Illustration shows how exclusive inner stainless steel wire braid prevents tube swelling, assures you of your greatest money's worth in CONCORD #20 Steam Hose . . . *because it lives longer!*

*Pat. applied for

BWH DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. · P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

ARE YOUR ELECTRIC TRUCKS GUILTY OF

"4 O'clock Letdown?"

READY-POWER DRIVE

for Full Efficiency ALL THE TIME!

Only Ready-Power gives your electric trucks full efficiency for every minute of every hour . . . all day long. And because Ready-Power-equipped trucks are so easy to operate, drivers are more efficient, too. Unlimited power plus alert drivers add up to more ton-miles per hour.

Remember . . . Your Truck Is No Better Than Its Power

CONTINUOUS-DUTY POWER UNITS

The READY-POWER Co.

3820 Grand River Ave., Detroit 8, Michigan

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

CARPETING! In a Factory?

New Mulsomastic Floor in the cutting and shipping room of the lithographing plant of the Piedmont Label Co., Bedford, Va.

THICK-PILE carpeting isn't a practical answer to making factory floors easy on workers' feet. But in the Piedmont Label Company, Inc., when a smooth resilient coating of Tremco Mulsomastic® was put down over a hard, broken cement floor, the foot-relief for employees was so marked it caused Master Mechanic H. J. Faribault to comment, "It's like walking on a carpet."

Mulsomastic is a mastic surfacing that can be quickly and inexpensively put down over old wood or concrete floors by independent contractors or your own crew, under Tremco direction.

It makes a warm, dry, resilient floor —easier to work on—more healthful. It stands up under heavy materials trucking. Paint covers and *stays put* for easy cleaning and good appearance.

Tremco Man Francis Lee, who planned the job with Vice President J. T. Davidson and Master Mechanic Faribault, is one of a large staff of Tremco field men who are prepared by special training, and wide experience to help you find the right answer to many building maintenance problems.

If you have a maintenance problem CALL IN A TREMCO MAN. No obligation. The Tremco Manufacturing Co., Cleveland, Ohio and The Tremco Manufacturing Co., (Canada) Ltd., Toronto.

Tremco Man Francis Lee

*Mulsomastic is a registered trade name.

TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

UM 1018

Underwood gets over 975,000 extra hinges from Carboloy die

METAL BLANK (top) is pressure-fed into die made from Carboloy cemented carbide slotted bushing (middle). Formed hinge is then ejected sideways from die (bottom).

Switch-over to die of long-wearing Carboloy cemented carbide increases die life 4000%, virtually eliminates maintenance costs . . . illustrates savings you can get in your plant, too.

After forming only 25,000 hinge loops, hard-steel dies at Underwood Corporation had to be completely rebuilt. A die of Carboloy cemented carbide was substituted. It formed over a million pieces . . . required absolutely no maintenance, showed no detectable sign of wear.

More, Carboloy cemented carbides have replaced hard-steel on a multitude of noncutting operations at Underwood. Throughout its Bridgeport Plant, carbide forming, swaging and punching dies have outworn steel dies from 40 to 100 times; have eliminated costly downtime and maintenance on several jobs.

WEARPROOFING BENEFITS

With Carboloy dies, users everywhere report longer die life, better product finishes, closer tolerances, fewer rejects . . . all the wearproofing benefits that mean more production at a savings in time, money and manpower.

Get these savings yourself. If you have high-cost, time-wasting blanking, forming, punching or drawing operations, consult the Carboloy organization. We are headquarters for the finest in high-quality cemented carbides . . . first in carbide die design and application services, outlined below. Write for free data.

Get all the extras, too . . . FREE!

Carboloy services are designed to help you conserve your dies . . . give you new highs in production at a minimum of maintenance, maximum of savings.

DIE ENGINEERING MANUAL, D-124: Vital facts to assist you in proper application techniques of cemented carbides to dies and punches for more efficient sheet-metal drawing, forming, blanking, etc. Write for free copy.

DIE TRAINING SCHOOL: Practical courses to teach your die-room personnel how to get the extra from carbide dies. Includes specialized courses in finishing and servicing dies. Write for specific information.

DIE ENGINEERING SERVICE: Skilled, job-experienced Carboloy Field Engineers are ready at all times to assist you with your die problems. Contact your local Carboloy Field Engineer or write for this free service.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11135 East 8 Mile Blvd., Detroit 32, Michigan

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company.

The use of Carboloy Cemented Carbides in press dies is just one of the countless ways that Carboloy created-metals benefit industry. Look to Carboloy metallurgists to bring you even broader fields of use for present *and future* Carboloy created-metals.

CARBOLOY CREATED-METALS

ALNICO PERMANENT MAGNETS for lasting magnetic energy
CEMENTED CARBIDES for phenomenal cutting, forming, wear resistance; including
CHROME CARBIDES for exceptional resistance to abrasion—erosion—corrosion
HEVIMET for maximum weight in minimum space, and for radioactive screening

FIRST IN MAN-MADE METALS FOR BETTER PRODUCTS

PROVEN PROTECTION?

MODEL 7702
—Full Neoprene coated industrial weight 14¼" gauntlet...6" cuff... liquid proof...curved fingers...for all industry.

you can be sure with...

HOOD

gloves!

MODEL 7701
—Full Neoprene coated with 4" cuff for use in industries where dipping operations, spray or splash are not too high.

"Put your employee's hands into a safer glove"

Are you sure that the gloves your employees are wearing are providing the best protection possible?
You can depend on this vital protection with Hood Industrial Work gloves because they are given rugged wear, before distribution, in actual "on the job" testing in industries and uses of every conceivable type. You *know* when you purchase Hood gloves that their ability to give more protection has already been proven!
So cut down needless costs by raising the standards of protection, efficiency, wear and comfort for employees' hands today with Hood gloves. They're better, whatever you desire . . . Rubber, Neoprene or Plastic—and for *every* job!

Write today for the colorful new catalog showing the entire Hood line.

HOOD for NEW Safety PLUS

HOOD RUBBER CO. Watertown, Mass.

MOTORLESS *Plantman* MEANS MORE PRODUCTIVITY FOR YOUR MAINTENANCE DEPARTMENT

CHANGE *FROM* OUTMODED SWEEPING METHODS — CHANGE TO MECHANICAL SWEEPING METHODS WITH SAVINGS THAT WILL LAST FOR THE LIFE OF YOUR BUSINESS.

Motorless Mechanical Floor Sweeping *Ups Productivity* because it collects as it sweeps. Combines all sweeping operations into ONE. Motorless Mechanical Sweeping is *TROUBLE FREE*. No Breakdowns —

No Tinkering
No Upkeep Required!

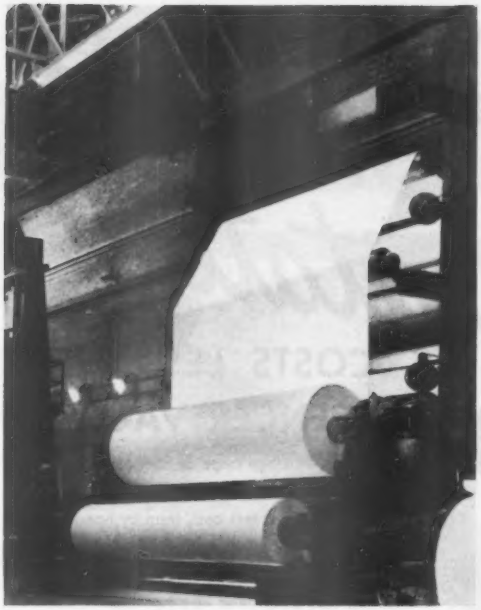
More Plantman Sweepers In Use Than Any Other Mechanical Sweeper — Why? Because it's motorless!

Sweeper widths 20" to 40"

HANDLING DEVICES CO., INC.
581 BOYLSTON ST., BOSTON 16, MASS.

Send me your illustrated brochure showing how PLANTMAN increases productivity.

Company .....
Street .....
City ..... State.....
Name ..... Position.....



Mill . . . Office . . . Assembly . . . Laboratory . . . Tannery

Trane Air Conditioning Serves Everywhere in Industry

If you have a heating or air conditioning problem in your plant, turn to the complete Trane line of heating and air conditioning equipment for a satisfactory answer.

In Mills—In a midwest paper mill, a forest of towering machinery blocked air circulation and prevented even heating. Trane Projection Unit Heaters equipped with Louver Cone Diffusers solved the problem economically by putting the heat right down where it was needed.

In Offices—Oft-opened doors can be a gathering place for fuel consuming drafts. An eastern chemical works has placed a Trane Force-Flo Heater on each side of the entrance to its attractive new administration offices to eliminate drafts at their source, and save fuel.

On Assembly Lines—With conveyors operating on several levels, overhead cranes in other parts of the plant, and the general factory area broken up into smaller areas, heating was a difficult problem. A midwest range manufacturer solved it by placing Trane Projection Unit Heaters with Louver Cone Diffusers thirty feet above the floor. Immediately, gentle heat is delivered to workers far below in the coldest weather.

In Laboratories—The laboratory of a large eastern manufacturer required plenty of filtered, tempered, fresh air to facilitate the testing of materials. Trane Unit Ventilators were installed under the windows to bring in fresh outdoor air and warm it to the desired degree, for a pleasant working atmosphere.

In Tanneries—Adequate control of temperature, volume of air, and humidity is important in the drying of hides. This tannery installed Trane Model H Horizontal Unit Heaters at floor level in its drying room. Warm air rises between the hides and the drying is uniform.

Whether it's mills, offices, assembly lines, laboratories, or tanneries, Trane heating and air conditioning serves everywhere in industry.

Whatever your heating, cooling, ventilating or air conditioning problem is, look for the answer in the complete Trane line.

On Assembly Lines—Trane Projection Unit Heaters with Louver Cone Diffusers at the ceiling keep workers warm.

In Laboratories—Trane Unit Ventilators provide plenty of fresh outdoor air for a comfortable working atmosphere.

In Tanneries—Drying hides is but one of the hundreds of applications of the Trane Horizontal Unit Heater.

TRANE

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division . . . Scranton, Pa.
Trane Company of Canada, Ltd., Toronto

OFFICES IN 80 U. S. AND 14 CANADIAN CITIES

TOO BUSY FOR BUSINESS?

Is your switchboard a bottleneck? It is whenever it's too busy with *inside* traffic to handle incoming and out-going *outside* calls!

TAKE THE LOAD OFF YOUR SWITCHBOARD

SELECT-O-PHONE (automatically and without an operator) handles *all inside* communications independently of your switchboard — permits you to talk privately to from one to fifty-five stations, individually or collectively! SELECT-O-PHONE saves manpower, helps expedite orders, puts action into ideas — frees your city phones for profit-making calls.

GET THE FACTS!
Mail coupon today for full information.

KELLOGG
Select-O-Phone
THE *INSIDE* VOICE OF BUSINESS

SELECT-O-PHONE DIVISION, Dept. 12-A
Kellogg Switchboard and Supply Company
6650 S. Cicero Ave., Chicago 38, Ill.

Please rush data explaining how I can save hours and dollars with SELECT-O-PHONE.

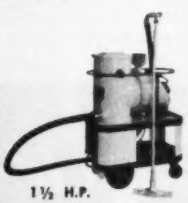
NAME_____
COMPANY_____
CITY_____ ZONE____ STATE_____

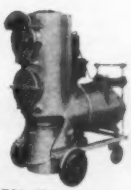
WHY GOOD *Plant Sanitation* COSTS LESS WITH SPENCER VACUUM

It is a fact that large or congested industrial areas can be Spencer Vacuum cleaned better and faster, at less cost, than by hand or with inadequate power. And with Spencer, the dirt container has ample capacity and is easily removed and rolled on casters to the point of disposal. In addition, special Spencer Vacuum tools take care of overhead pipes, walls, machinery and even the boiler tubes and hot materials which can be removed before they cool off.

AN EXTRA DIVIDEND. But the big saving comes when you apply Spencer Vacuum to the production line. For instance, you can recover valuable metal chips by the ton, convey loose materials by the carload, remove welding and other toxic fumes at their source and speed up bench and assembly work in every department.

There are at least 132 Essential and Unusual Uses for Spencer Vacuum in Industry—all described in Bulletin No. 144—yours for the asking.


1½ H.P.


7½ H.P.

427-D

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

SEE FOR YOURSELF—Next time try a

FORT WORTH TRANSCO QD SHEAVE

FORT WORTH WAREHOUSES *Mean Better* V-DRIVE SERVICE

You will receive the best in service, sheaves, and V-belts when you buy a Fort Worth-Transco V-drive.

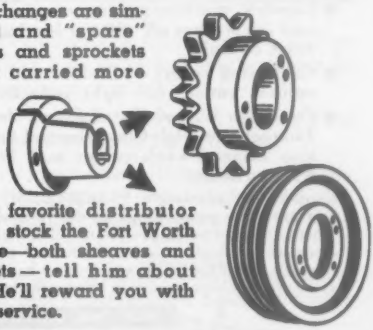
Two manufacturing plants and a large foundry designed to make V-belt sheaves assure volume production even in periods of short supply. Factory warehouses supplemented by numerous distributors provide quick delivery on stock sizes.

The advantages of "QD" construction are many. We will be pleased to explain them to you at any time.

Fort Worth-Transco V-Belts are made for us under our own trade name by B. F. Goodrich in the patented Grommet construction. All belts are "Double-Matched" to assure long drive life and complete satisfaction.

"QD" HUB ALSO FITS FORT WORTH "QD" Roller Chain Sprocket

Speed changes are simplified and "spare" sheaves and sprockets can be carried more easily.



If your favorite distributor doesn't stock the Fort Worth QD line—both sheaves and sprockets—tell him about them. He'll reward you with better service.

Write for descriptive catalogs on "QD" Sprockets and Sheaves. Address Dept. 61 and they will be sent to you immediately.

OTHER FORT WORTH PRODUCTS
ROLLER CHAIN SPROCKETS
SCREW CONVEYORS and ACCESSORIES
SCREW ELEVATORS
INDUSTRIAL FANS

WAREHOUSES:
CHICAGO
LOS ANGELES
ST. LOUIS
KANSAS CITY
MEMPHIS
CINCINNATI
NEW YORK
HOUSTON
ATLANTA

FORT WORTH STEEL AND MACHINERY CO.

Dept. 61, 3600 McCart St, Fort Worth, Texas

SLASH MAINTENANCE PAINTING COSTS...

UP TO 40%

Enterprise STAIZE-CLENE

THE NEW MIRACLE DIRT REPELLING DISCOVERY

World's Only Paint Made With Patented **SYNCON***

*Made Under U. S. Patent No. 2,353,910

- **Gives walls and ceilings 2 to 3 years of extra service — stays clean from 79% to 90% longer**
- **Lipstick, machine grease, merchurochrome and ink washes off without leaving a single trace of stain**
- **Calibrated colors — Da-Lite and Eye-Rest colors "rated" for light reflective values**
- **Complete line of Flat Enamel, Semi-Gloss Enamel and High-Gloss Enamel finishes — also Enamel Undercoater and Pigmented Primer Sealer**

Compare the advantages STAIZE-CLENE gives you over any other paint. Weigh its dirt resistant qualities —note its better coverage—the fact that it goes farther —consider its high resistance to fumes—this will tell you why STAIZE-CLENE with Syncon has been hailed as the greatest improvement in paint in the last 20 years!

Send for the FREE STAIZE-CLENE Manual—"How You Can Reduce Your Maintenance Painting Cost," and learn how you can make substantial savings with this unbeatable maintenance finish.

MAIL THIS COUPON TODAY!

ENTERPRISE PAINT MFG. CO.
Dept. S.C. FM-1
2841 S. Ashland Ave., Chicago 8, Illinois

Please send me the FREE Manual—"How You Can Reduce Your Maintenance Painting Cost."

Name_____
Firm_____
Address_____
City_____ State_____

NO OTHER *Electric* HAND SAW Does . . . So Much So Fast . . . So Well

LESTO

SAWS

- 2" Hard or Soft Wood
- Curves of All Types
- Insertions
- Plastics

Designed, Manufactured and Patented by Scintilla, Ltd., Switzerland, since 1944.

Write for Literature

Sold & Serviced in Principal Cities Throughout U.S.A.

VICTOR J. KRIEG, Inc.

Sole U.S. Representative for Scintilla, Ltd. Switzerland
51 West 52nd St., New York 19, N. Y.
ELdorado 5-4030
Some Sales Territories Available

TAC does what no other tool can do!

AT LAST! AN OPEN-END RATCHET WRENCH — the world's first true *universal* wrench. A patented design for connections on tubing, rods, piping, conduit, studs, etc. Sixty-four socket sizes from 3/8" to 4". Smallest effective ratcheting arc yet — 5° to 7½°. TAC will also do every job any ordinary ratchet wrench will do: one TAC set replaces literally dozens of single-purpose hand tools.

makers of advanced tools for industry

TAC

TAC is a registered trademark of

TUBING APPLIANCE CO.
7112 South Victoria • 10321 Anza Ave. • Los Angeles, Calif.

How do you select

A PORTABLE POWER TOOL?

One tool engineer is influenced by light weight – another by high speed – a third by ease of handling – others by low power requirements or low maintenance.

Important as all these advantages are – the deciding factor should be the *work productivity* of the tool.

SUPER CYCLE ELECTRIC TOOLS have 10% to 20% greater productivity than any other type of portable tool. This can be demonstrated in your own shop, under your own operating conditions.

If you use, or can use, six or more portable tools in one location, we shall be glad to arrange for a demonstration of the advantages of SUPER CYCLE ELECTRIC TOOLS.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

Write for Catalog 905-2

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

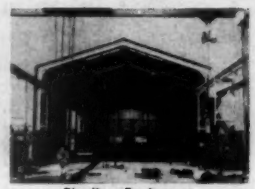
YOU SAVE ERECTION TIME and MONEY with STEELCRAFT STEEL BUILDINGS

because STEELCRAFT does it all...

Textile Manufacturer

Precision Machining Operation

Storage Warehouse



Pipeline Equipment Fabricator

Planning

For best results, call in Steelcraft during the early planning stage. That's when Steelcraft engineers can effect the greatest savings through the utilization of mass produced standardized building units resulting in savings in erection time and labor.

Engineering

Working closely with the engineer, architect, contractor and owner, Steelcraft Engineers can recommend and incorporate standardized building units that will perform the necessary functions to meet the exact requirements of a particular building... the result is a definite savings on over-all construction costs.

Supply

Steelcraft's fully integrated manufacturing operations with a continuous flow of standard parts and primary accessory items such as windows and doors, assure delivery of the complete building on time... from one source and with one responsibility.

... and Steelcraft Permanent Type Buildings meet all building codes ... earn lowest insurance rates ... qualify for maximum loans. Steelcraft Buildings are not to be confused with temporary prefabs. They are permanent structures designed to meet the *exact* requirements of any particular plant. There is no limit to the selection of collateral materials. Masonry walls may be used to match existing structures or galvanized ribbed, corrugated asbestos or aluminum panels may be specified. Steelcraft Buildings can be insulated when required.

Get the cost saving factors on a Steelcraft Building to solve your present and future space needs. Write now.

STEEL Craft

STEELCRAFT MANUFACTURING COMPANY
ROSSMOYNE, OHIO (IN GREATER CINCINNATI)

Mail Coupon today

STEELCRAFT MANUFACTURING CO., Dept. FM-152
9017 Blue Ash Road, Rossmoyne, Ohio

☐ Send engineer to survey my building requirements.

☐ Send me information on complete line of Steelcraft Metal Buildings.

Name_____ Title_____

Company_____

Business Address_____

City_____ Zone____ State_____

MERRILL MATERIALS HANDLING DEVICES

MERRILL BROTHERS
56-37 ARNOLD AVENUE
MASPETH, N. Y.

For Service and Safety...

Re-Floor with Flintkote

Patching...Resurfacing...complete New Surfacing is quick and easy with cold-laid asphalt mastic mixtures.

You cut cost three ways when you repair or re-floor using Flintkote Flooring Emulsions.

Installation is fast. This means a minimum of preparation to apply and a saving in time loss through interruptions of operation. Mastic made with Flintkote Flooring Emulsions can be hand finished or power floated and opened to normal traffic in as little as 48 hours.

Maintenance is minimized. The resilient qualities of these floors make them truly heavy duty. They absorb shock from heavy loads. They do not require joints. And traffic irons out minor cuts or bumps. Patches may be featheredged.

Service life is long and pleasant. You'll get years of trouble-free service from Mastic made with Flintkote Flooring Emulsions. And a bonus of employee satisfaction goes with it, because these floors offer a comfortable surface on which to work. They're resilient and quiet . . . serve to insulate against cold floors.

So, don't fail to specify Flintkote Flooring Emulsions whether purchasing for your own use or letting a contract, and thereby obtain the floor that gives you top quality . . . while it saves you money. Comprehensive literature is yours for the asking.

THE FLINTKOTE COMPANY *Industrial Products Division*
30 Rockefeller Plaza, New York 20, N. Y.
Atlanta • Boston • Chicago Heights • Detroit • Los Angeles
New Orleans • Washington • Toronto • Montreal

Here's a New Idea-Book for You!

The Flintkote Industrial Products "Digest" covers factory-maintenance and factory-processing problems.

It presents briefly the essential characteristics and many of the ways that Flintkote Industrial Products can serve you better. The recommendations contained in it are based upon Flintkote's half century of leadership in this field.

It's an important booklet for you to look over for ideas...and file for ready reference.

Send for your free copy today.

FLINTKOTE *Products for Industry*

take a load off your plant operating costs!

standardize on industrial doors "tailor-made" by —

INTERNATIONAL STEEL

Power- and hand-operated doors of every type — ranging in size from the smallest right up to the world's largest . . . specially developed to guarantee fast, safe, trouble-free performance under extreme conditions — they're ALL included in International Steel's steadily growing files of completed jobs. Few firms, indeed, can draw upon a comparable background of experience in designing and producing industrial doors. Check the potential savings International entrances can bring to YOUR operation . . . NOW!

International I-Plank Vertical Lift Steel Warehouse Doors — designed and constructed for a leading wholesaler of industrial building and operating supplies, and automotive equipment.

For Seasoned Counsel on Any Industrial Entrance Problem . . . Write or Wire:

INTERNATIONAL Steel Co.

STRUCTURAL STEEL
INDUSTRIAL DOORS
REVOLVING DOORS
STEEL BUILDINGS

1905 Edgar Street
Evansville 7, Ind.

HiDUTY LIFT TRUCKS

work for LESS!

- Economical to Operate
- Economical to Maintain

Write for the FACTS

Transitier Truck Co.

2477 N. W. 23rd Avenue
Portland 10, Oregon

for better performance with less down-time

POWER YOUR EQUIPMENT WITH Wagner MOTORS

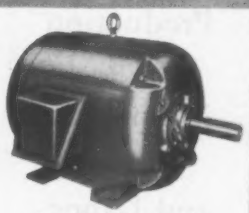
Modern high-speed production is based on the ability of machine tools to turn out a continuous flow of identical parts. Precision is all-important—so is continuity of operation. Machine tools powered with Wagner totally-enclosed Motors are assured freedom from excessive down-time caused by motor failure, because these motors are designed to operate under the adverse conditions often encountered in machine tool operation. They are fully protected against steel-filings, chips, dust, dirt, fumes and moisture. They require no maintenance other than periodic lubrication.

The machine pictured here does rough boring of 6-cylinder engine blocks. It is equipped with Wagner totally-enclosed fan-cooled motors. At the top is a 100 hp Wagner Type CP.

When you power your equipment with Wagner Motors, you have assurance of uniform performance with exceptionally little trouble . . . Wagner Motors are known for completely dependable operation in their specific applications.

When you standardize on Wagner Motors —you get the advantages of a liberal warranty . . . of nationwide service facilities, with replacement motors and parts available from more than 650 Authorized Service Stations plus 25 Wagner-owned Service Branches.

You can choose from a wide variety of types and sizes (from 1/125 to 400 hp). Bulletin MU-185 gives complete information—write for your copy.



Type CP totally-enclosed, fan-cooled motor.

Type TP totally-enclosed, non-ventilated motor.

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6412 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

3252-4A

when the Ballerina fell flat on her dignity

INS reports an unusual performance by a famed ballet company in Detroit.

When members of the cast started sitting down suddenly, the audience suspected this was not in the script. But when the Prima Ballerina's dainty toes slid from under her—the audience was convulsed.

The culprit? Freshly laid linoleum on the stage, so highly polished it was as slippery as a skating rink. Hardly a safe surface for dancing—or even walking.

SLIP-ACCIDENTS are seldom funny to the victim. And there's no economy in lost man-hours and negligence suits. That's why heavily-trafficked buildings from coast to coast rely on the LEGGE SYSTEM of Safety Floor Maintenance.

Our Safety Engineers custom-tailor maintenance programs to your needs—give you floors that *shine without slipperiness.* They teach your crews how to properly apply LEGGE Safety Products. Show you *big* savings in labor and materials. One well-known institution cut its yearly maintenance budget from $60,000 to $40,000 with the LEGGE SYSTEM.

There is no charge for the services of a LEGGE *Safety Engineer. Write today for full information. Mail coupon for a FREE Copy of "Mr. Higby Learned About Floor Safety—the Hard Way!"* WALTER G. LEGGE COMPANY, INC., 101 Park Ave., New York 17, N. Y. In Toronto—J. W. Turner Co. Branch offices in principal cities.

LEGGE SYSTEM of Safety Floor Maintenance

Walter G. Legge Co. Inc. A-1
101 Park Ave., New York 17, N.Y.

Please send me a free, no-obligation copy of your Mr. Higby book.

Signed_____

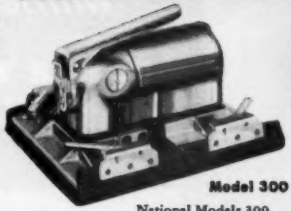
Firm_____

Address_____

City_____ State_____

See us at Booth 226, Plant Maintenance, Philadelphia.

Sanding Problems?

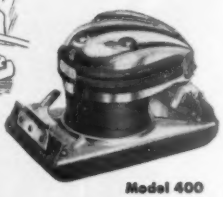


Model 300

NATIONAL SANDERS

can speed production in your finishing room

National Models 300 and 300A are straight line action, reciprocating, two-pad, air sanders. Felt, rubber, and neoprene pads in different sizes and shapes are available for various types of surfaces and materials. Water attachment is built in for wet sanding.



Model 400

National Models 100 and 400 are orbital action, single pad, air sanders. Orbital action provides faster cutting and longer abrasive life. These lightweight, vibrationless, fast sanders can cut finishing time as much as 75% over hand sanding. See your dealer, or write for details.

NATIONAL NS SANDERS

NATIONAL AIR SANDER, INC.
2816 AUBURN STREET, ROCKFORD, ILLINOIS

CUSTOM-BUILT — NOT CUSTOM PRICED

Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

Write for Complete Details Today

VALLEY
ELECTRIC CORPORATION
4221 FOREST PARK BLVD. · ST. LOUIS 8, MO.

For a list of reprints of some of FACTORY's best recent articles on a variety of subjects on

•

Production

•

Maintenance

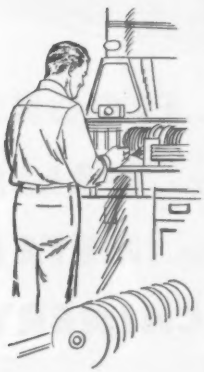
•

and Labor

•

SEE PAGE

3 6 8



Workers Can See What They're Doing In This Plant

Production men know that good factory lighting steps up production, cuts down spoilage, improves employee morale. But, to correct inadequate lighting, many plants merely increase the footcandles of light intensity—and think they've solved the problem. Actually, *too much* light . . . or glare from bare fixtures . . . can be as harmful as insufficient light. To get best results from plant and worker, light must be adequate *and* comfortable.

Day-Brite designs industrial lighting fixtures which give *both* adequate and comfortable light. In the Day-Brite lighted plant shown above, you can see clearly and without strain . . . without glare or shadows . . . in every part of the plant.

And — Day-Brite makes *only* quality fixtures which give years of trouble-free service . . . the lowest possible installation and maintenance costs. Proof? The hundreds of large American factories which use Day-Brite fixtures . . . and get complete satisfaction.

If *you* have factory lighting problems ask Day-Brite for help without obligation. Write to Day-Brite Lighting, Inc., 5441 Bulwer Ave., St. Louis, Mo.

**The upward component provided through the reflector apertures minimizes contrast between the fixture and the surrounding ceiling area, adding to the overall comfort of the complete installation.*

NOW, MORE THAN EVER

AMERICA MUST SEE WHAT IT'S DOING

IT'S EASY TO SEE WHEN IT'S

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

141

TOSS OUT ELEVEN GLOVES

TWELVE different kinds of work gloves, formerly needed for various operations in one large factory, have been replaced by a single type of cotton work glove dip-coated with VINYLITE Brand Resins.

Similar gloves, used in handling nitric acid drums at a military proving ground, were accidentally subjected to acid contact. There was some discoloration, but no penetration and no deterioration.

Hundreds of other users are telling the same story. No matter how tough the job, gloves with coatings of VINYLITE Brand Resins have outlasted all others and given greater protection to the wearer, with resulting increases in efficiency and economy.

Men who handle rough steel sheets, lumber, or concrete blocks, know how durable these gloves are. Welders like their protective qualities. They're strongly resistant to acid and alkali solutions and other chemicals. Their rough surface means a surer grip and longer wear—oil is easily washed off. They're more comfortable—flexible enough for any ordinary glove operation. They can be turned inside out and their cotton linings washed.

Glove-coating is one example of how VINYLITE Resin coatings are being used throughout industry, giving increased protection and longer life to a wide variety of surfaces including metal, concrete, masonry. Formulated for application by dip, brush or spray, VINYLITE Resin coatings may have a big place in your plant or product. Ask us about your specific needs and send for a list of suppliers of gloves coated with VINYLITE Brand Resins. Write Dept. LQ-86.

Data courtesy of Arcadia Mfg. Co., 1081 South Eton Road, Birmingham, Mich.

Visit BAKELITE'S Exhibit, Booth 314-324, National Plastics Exposition, Philadelphia, March 11-14.

Vinylite
BRAND
RESINS

TRADE MARK
BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

IF YOU WANT HEAVY DUTY PERFORMANCE

★ *Favorite for...* **FLOORS**

★ *Wonderful for...* **WALLS**

★ *Marvelous for...* **METAL** *and* **MACHINERY**

For free color card and testimonial proof of the heavy duty performance of this product and for the name of your nearest distributor write to—

VALDURA
PAINTS THAT ENDURE

VALDURA DIVISION
AMERICAN-MARIETTA CO.
101 E. Ontario St., Chicago 11, Ill.

Now, more than ever before...

YOU NEED THE PROTECTION OF

WIREBOUND BOXES and CRATES

Losses due to container failure have no place in an industrial economy facing material allocations and shortages. That's why you should investigate *Wirebounds* —which combine the strength of steel with thinner wood to bring you *better product protection at lower cost.* Three hundred graduate engineers of the Wirebound Institute have been technically trained to design tailor-made *Wirebounds* which assure damage-free product delivery. The value of this container engineering is clearly demonstrated in the following case histories. We will be glad to show you how these benefits apply to *your* product. Use the coupon below.

YOU CAN CUT DAMAGE CLAIMS LIKE THIS:

Upside-down loading of circuit reclosers caused breakage, leakage, sometimes irreparable damage in handling and transit. Since switching to Wirebounds, company reports damage claims have become negligible.

Using Wirebounds designed to "float" 400 lb. precision engines, this manufacturer chalked up a record of 3000 shipments in fifteen months without a single instance of damage in transit due to container failure.

Flexible power saw maker reduced shipping weight from 820 to 775 pounds, cut crating time 30%. Company stacks and handles units four high. Shipping damage due to container failure has been completely eliminated.

choose your course of action...

Wirebound
BOXES & CRATES

☐ Send me general information . . . complete descriptive book titled "What to Expect from Wirebounds."

☐ Send me specific information . . . tear sheets of case histories of packing products similar to mine.

☐ Give me direct action send an Institute trained sales engineer to show the advantages of Wirebound packing for my own product.

NAME _____ POSITION _____

FIRM _____

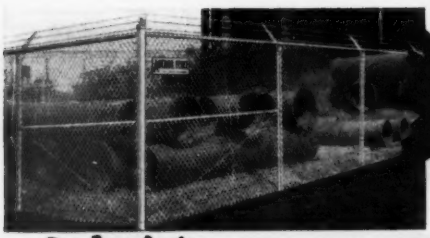
STREET AND NUMBER _____

CITY _____ ZONE _____ STATE _____

OUR PRODUCT IS _____ IT WEIGHS _____

Users names on request

mail now to WIREBOUND BOX MANUFACTURERS ASSOC.
Room 1155—327 South LaSalle Street, Chicago 4, Illinois



Makes Outdoor Storage Safe!

Controls Traffic In and Out of Plant!

Keeps Out Trespassers. Guards Defense Production!

Get *3-WAY* plant protection with these 4 EXCLUSIVE ANCHOR FENCE FEATURES

No doubt about it, Anchor Chain Link Fence gives you the exclusive features that add up to more protection, better protection, longer-lasting protection for your plant!

1. **Deep-Driven Anchors** hold the fence *permanently* erect and in line, in any soil, in any weather.

2. **Square Frame Gates** provide additional strength, resist sagging and warping to an amazing degree.

3. **H-Beam Line Posts** are rigid and rust-resistant because their open construction is self-draining.

4. **Square Terminal Posts** increase strength and durability, and improve appearance.

For more facts on Anchor Fence—details, fencing ideas, photos of well-known installations—send for our fact-packed Industrial Fence Catalog. Or ask for one of our experienced engineers to call and give you the benefit of his knowledge in solving your plant protection problems. Write today: ANCHOR POST PRODUCTS, INC., *Industrial Fence Div.*, 6620 Eastern Ave., Baltimore 24, Md.

Anchor Fence

Nation-wide Sales and Erecting Service

LIKE AN

ATOM-IC

EXPLOSION

Just 1/32" (pinhole size) faucet leak

MUSHROOMS into ATOMIC WASTE

of approximately 95,000 gallons of water yearly—costing:

$24.14

@ $1.90 per M cubic feet

If a hot water faucet, then (actual) FUEL WASTED heating 95,000 gallons costs approximately:

$88.91 if coal (9473 lbs.)
$91.08 if oil (702 gals.)
$84.41 if gas (84,411 cu. ft.)

Above figures authenticated by Hackensack Water Co. and American Gas Association.

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with "SEXAUER" "Easy-Tites" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D.

"EASY-TITE" FAUCET WASHERS

...a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 350°F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day superheating water systems — that formerly broke down washer's structure.

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape...causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

THE NEW "SEXAUER" CATALOG

Edition G, just out, pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. *Send for your copy today!*

Then too, there's a SEXAUER TECHNICIAN with a truck, coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture, regardless of make or age and *without obligation.*

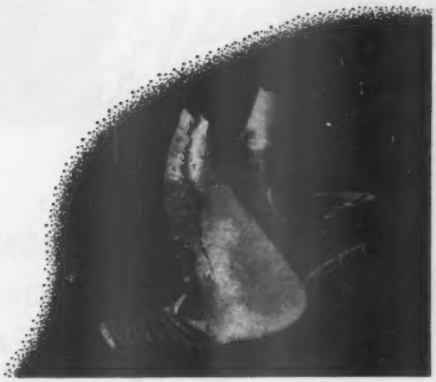
A postcard will bring him and your NEW Catalog promptly.

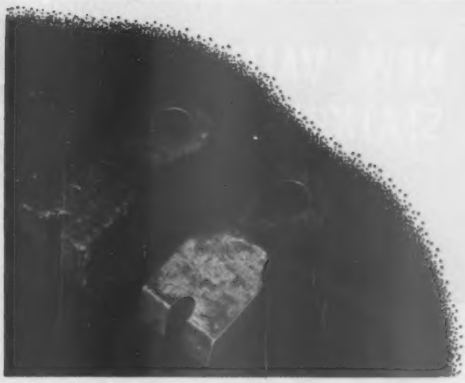
J. A. SEXAUER MFG. CO., INC., Dept. F-12
2503-05 Third Avenue, New York 51.

as advertised in the EVENING POST

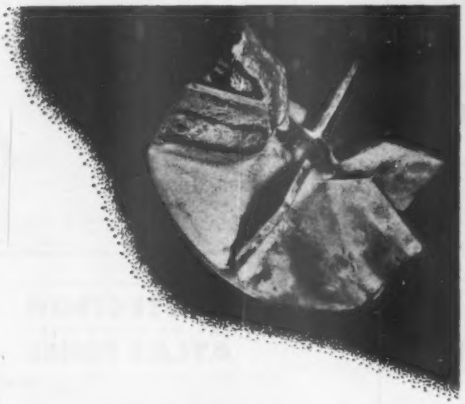
SEXAUER

WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS





NAME YOUR HARD-FACING JOB!



WEAR-ARC

hard-facing electrodes will do it . . .

★ *BETTER*

★ *FASTER*

★ *CHEAPER*

EXPERIENCE PROVES that to reclaim worn equipment and parts . . . to hard-face against excessive wear . . . *Wear-Arc* hard-facing alloys are tops. Equipment life is increased three, four, or more times . . . welds last longer . . . resist abrasion and impact better. Use the seven basic *Wear-Arc* types, singly or in combination — then judge for yourself, strictly on the basis of *results.*

★Contact your Alloy Rods Distributor or write for Wear-Arc Bulletin 5651.

Alloy Rods Co.

ALLOY RODS COMPANY

No Finer Electrodes Made . . . Anywhere

YORK, PENNSYLVANIA

AR-3

NEW, VALUABLE BOOKLET ON STATIONARY AIR COMPRESSORS

Latest Data on HOW to Save and WHY You Save By Using SCHRAMM

12 color pages include:

- Savings Provided Up to 50%
- Space-Saving Advantages
- Value of Unit System
- No Foundation Required
- Complete Schramm Installation with Schramm Accessories
- Construction Details Blueprinted
- Weights and Dimensions
- Unistage . . . Belt Drive . . . Direct Motor Drive

Extras

. . . in fact, the complete Schramm story on stationary air compressors.

Write today for your free copy

SCHRAMM AIR COMPRESSORS

SCHRAMM, INC.
The Compressor People · WEST CHESTER · PENNA.
DEPT. F

NAME _____

STREET _____

CITY _____ ZONE _____ STATE _____

KALMAN PROCESS *makes* CEMENT FLOORS *tougher!*

No chance for a "softie" when you specify Kalman floors. In surfacing, Kalman "absorption control" densifies and pre-shrinks the topping, producing concrete of the highest compressive value — a uniformly tough surface of maximum durability.

Bulletin gives all the facts — yours for the asking!

KALMAN FLOOR COMPANY
110 E. 42nd St., New York 17, N. Y.
Boston • Charlotte • Chicago • Cleveland
Dayton • Detroit • Houston • Los Angeles
Philadelphia • San Francisco

PROTECTION DAY OR NIGHT WITH ATLAS FENCE

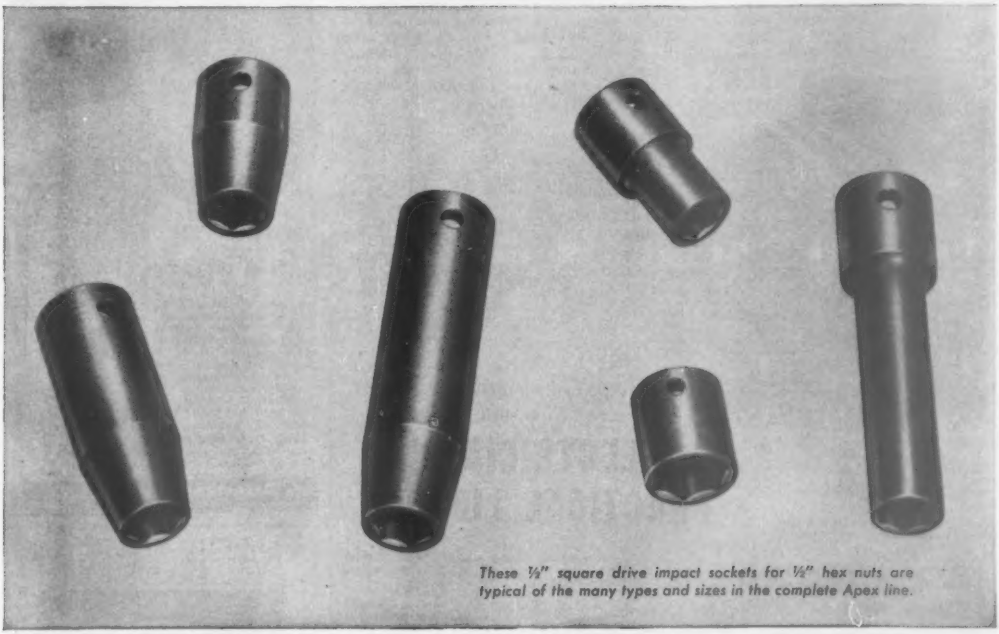
ATLAS chain link fence of bethanized* wire protects industrial plants, institutions, schools and homes against the occurrence of losses and property damage and against personal injuries and prying eyes. Electrolytic application bonds heavy zinc coating to the steel, producing uniform coating that adds years of service. Engineered to your requirements and installed by experts.

*A Product of the Bethlehem Steel Company

ATLAS

ATLAS FENCE COMPANY
3662 Richmond Street
Philadelphia 34, Penna.

Ask APEX— FOR SQUARE DRIVE *impact sockets*



These ½" square drive impact sockets for ½" hex nuts are typical of the many types and sizes in the complete Apex line.

SQUARE DRIVES: 1/4" 9/32" 3/8" 1/2" 5/8" 3/4" 1" 1-1/2" 2-1/2"

BROACHED OPENINGS: for HEX nuts 3/16" to 5", for SQUARE nuts 1/4" to 2".

Apex offers a complete range of impact sockets for your nut setting operations . . . short, standard, long and extra-long lengths . . . standard and thin wall . . . magnetic types for hex head sheet metal screws.

Apex impact sockets, expressly designed for continuous, heavy-duty service, provide greater freedom from quick wear-out and tool breakage, help increase productive output and reduce your tool costs.

Catalog 29 lists thousands of stock items—write, on your company letterhead please, for your copy of this comprehensive catalog. For special applications, enclose sketch or blueprint—we'll quote promptly.

APEX TOOLS

sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY

1025 S. Patterson Blvd., Dayton 2, Ohio

POWER BITS, INSERT BITS AND BIT HOLDERS, FOR PHILLIPS, FREARSON (Reed & Prince), SLOTTED, CLUTCH HEAD and SOCKET HEAD SCREWS • HAND DRIVERS FOR PHILLIPS, FREARSON AND CLUTCH HEAD SCREWS • TWO-PIECE DRIVERS FOR HEX HEAD SCREWS • SOCKETS, EXTENSIONS, ADAPTERS AND NUT SETTERS • UNIVERSAL SOCKETS, EXTENSION WRENCHES AND ADAPTERS • AIRCRAFT AND INDUSTRIAL UNIVERSAL JOINTS • SELF-RELEASING AND ADJUSTABLE STUD SETTERS • SAFETY FRICTION TAPPING CHUCKS • VERTICAL FLOAT TAPPING CHUCKS.

BE AN EXPERT IN PRACTICAL ELECTRICITY

Fit yourself for advancement and big earnings in the great field of opportunity—practical electrical work. Here is a fine set of books to help you—simple, thorough, in line with today's electrical methods and machines. Working with these books, at your own pace, using your own job as a laboratory proving-ground, if you wish, makes one of the easiest, most direct, and *inexpensive* ways you can take to become a top-pay electrical expert.

6 vols.
2700 pages
1678 illustrations

The newly-assembled
McGraw-Hill

ELECTRICIANS' PRACTICAL LIBRARY

CONTAINS THESE 6 HELPFUL VOLUMES

ELECTRICITY, Principles, Practice, Experiments, by Charles S. Siskind

MATHEMATICS FOR ELECTRICIANS, by Martin H. Kuehn

PRACTICAL ELECTRICAL WIRING, Residential, Farm, and Industrial, by H. P. Richter

ELECTRICAL MACHINES, Direct and Alternating Current by Charles S. Siskind

CONTROLLERS FOR ELECTRIC MOTORS, by Henry D. James and Lewis E. Markle

ELECTRONICS IN INDUSTRY, by George M. Chute

Everyday Reference for practicing electricians

Each volume fully indexed; bold-type subject headings throughout books; many tables, charts, schematic diagrams, photos, etc.—besides improving your electrical knowledge and skill, books condense many facts into small space, make them conveniently available whenever you have practical electrical problems to look up.

TO do best work in electricity—to be able to solve a job problem when the regular method doesn't seem to work—requires knowing electricity from the ground up—requires knowing *why* as well as *how*.

And that's what this set of books gives you—an overall treatment of everything you need to know, from grounding in basic theory and fundamentals up to work in the relatively new field of industrial electronics.

- the principles of direct and alternating current are explained, with what they mean *practically* in the construction and operation of electrical circuits, devices, and machines made graphically clear
- you also are shown just the mathematics the electrician uses, in a well-illustrated treatment that takes you from the simplest formulas of wiring work up to the solution of complicated circuit problems
- how to wire for light and power is a basic job of the electrician that is fully covered. Included are farm, residential, and non-residential installations, with instructions for planning and doing the work, in both new and old buildings
- a generous part of the library is devoted to giving you practical knowledge of electrical machines — generators, motors, transformers, converters, controllers, etc.—with the many facts you need to select, install, and operate them efficiently
- lastly the tubes, circuits, and generally split-second operations of electronic devices are made clear to you. Here is information the electrician, especially in industry, needs more and more today, and can quickly make use of, as it is presented in this library.

10 DAYS' FREE TRIAL

Library price saves you $5.50 on catalog price of books

EASY TERMS

McGraw-Hill Book Co., 330 W. 42 St., N.Y.C. 36

Send me Electricians' Practical Library, 6 vols., for 10 days' examination on approval. In 10 days I will send $4.50, and $4.00 monthly thereafter until $24.50 is paid, or return books postpaid.

(Print)

Name .....

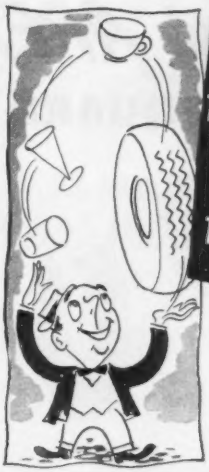
Address .....

City .....Zone.....State.....

Company .....

Position Fac-1

This offer applies to U. S. only.



from TUMBLERS to TIRES!

Whether your material is hard or soft, hot or cold, there's an "Old Faithful" marker designed for you. For over a century—as industry expanded in the United States—"Old Faithful" produced new markers to meet the needs of marking engineers. So "When Identification Counts—You Can Count on OLD FAITHFUL."

There's an OLD FAITHFUL MARKER designed to fit every need.

Write today for Free Industrial Crayon Guide—Dept. F-47

The American Crayon Company
Sandusky, Ohio New York

MERCOID

FOR INDUSTRIAL APPLICATIONS REQUIRING POSITIVE CONTROL OF PRESSURE, TEMPERATURE, LIQUID LEVEL ETC.

They Have What Experienced Engineers Want—

POSITIVE SAFETY
EASE OF INSTALLATION
CONVENIENT ADJUSTMENTS
YEARS OF DEPENDABLE PERFORMANCE

TRANSFORMER-RELAYS

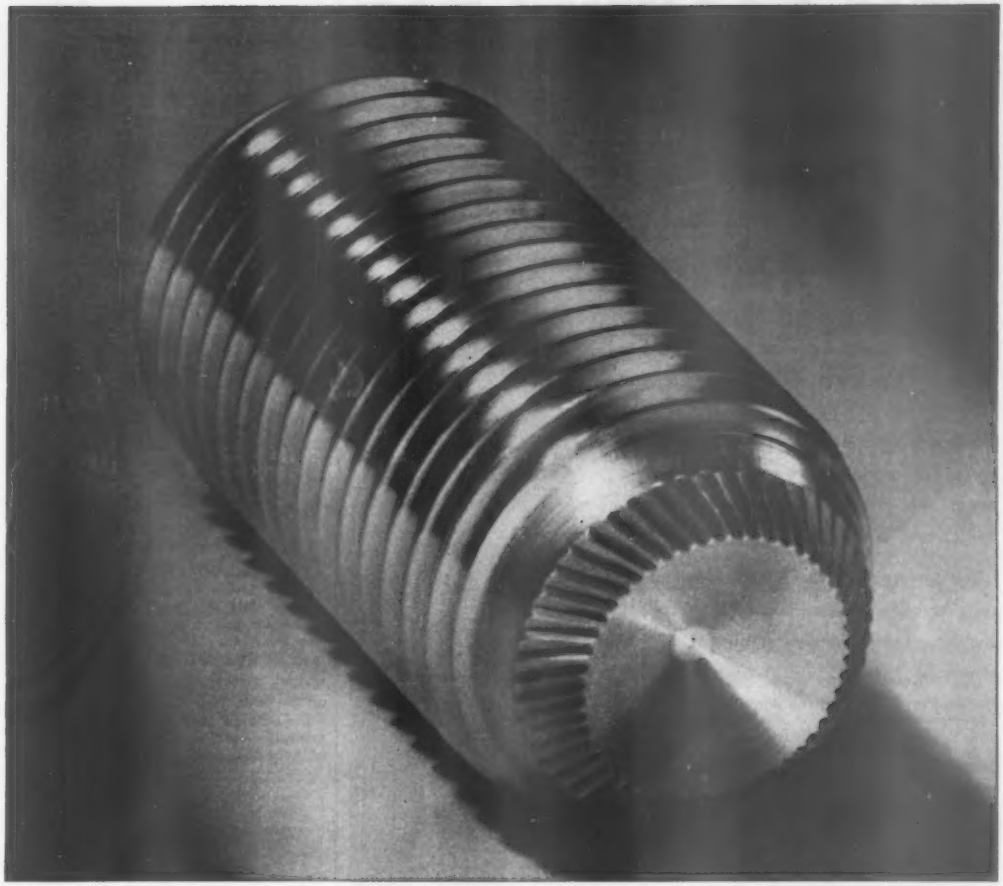
Mercoid Relays are unlike the common clapper type relays. All noise and residual magnetism are eliminated. Equipped with mercury switches no open contacts used.

MERCURY SWITCHES

Mercoid switches are not affected by dust, dirt or corrosion. They have many definite applications where open contacts are not suitable. Various types available.

WRITE FOR CATALOG 700 -- PLEASE MENTION THIS PUBLICATION

THE MERCOID CORPORATION
4201 BELMONT AVE. CHICAGO 41, ILL.



SELF-LOCKING SOCKET SET SCREWS

ORIGINATED BY UNBRAKO

. . . the screws that won't work loose

Unique counterclockwise knurls make these UNBRAKO Set Screws self lockers, prevent creep and subsequent loosening. Because UNBRAKO Self-Locking Set Screws stay tight, even in poorly tapped holes, they reduce maintenance costs and production losses. Write for descriptive literature. STANDARD PRESSED STEEL Co., Jenkintown 11, Pennsylvania.

SPS recommends STANDARDS — #4 to 1" available in UNBRAKO distributors' stocks.

Ask your UNBRAKO distributor about deliveries. You'll be pleasantly surprised. Even in the larger sizes, you'll find deliveries of UNBRAKO Screws are good.

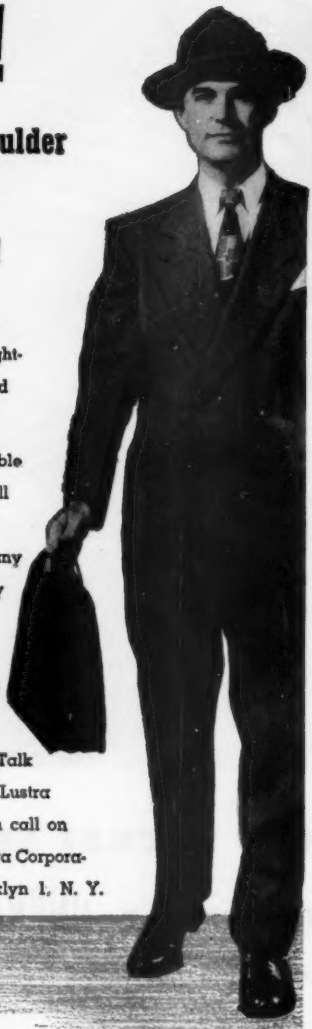
SPS

JENKINTOWN PENNSYLVANIA

UNBRAKO SOCKET SCREW DIVISION

HE'S LOOKING FOR TROUBLE!

Your Lustra Man will shoulder your lighting problems... and save you money, too!



TODAY, over a hundred thousand stores, plants and institutions are getting better lighting at lower cost . . . because they've turned the job over to their Lustra Man.

This new way of buying lighting is available only through your local Lustra Man. You'll find him conscientious, capable and thoroughly qualified to solve practically any lighting problem with the complete quality line of Lustra Double Duty Lamps and Fluorescent Tubes. Lustra Lamps are premium-built for full light output throughout their extra long-burning lives.

Get the most for your lighting dollars. Talk over your lighting requirements with your Lustra Man. Simply write us and we'll have him call on you, or phone you for an appointment. Lustra Corporation, Dept. T-1, 36 Washington St., Brooklyn 1, N. Y.

Lustra

AMERICA'S DATED LAMPS

Double-Duty Reflector Lamps, Incandescent Lamps, Fluorescent Tubes, Spotlites, and Floodlites, Rugged Duty Lamps, Fluorescent Fixtures and Starters.

IF IT'S GOOD ENOUGH FOR ULTRA-FINE RADIOACTIVE DUSTS

IT'S IDEAL FOR YOUR MOST HAZARDOUS JOBS

Sectional view of MIKRO-COLLECTOR showing felt filter bags and reverse jet cleaning ring.

The MIKRO-COLLECTOR* has virtually no rival in the collection of radioactive dusts of ultra-fine particle size. Its installations for this purpose alone, during the past year, have a combined capacity of more than 100,000 cfm.

We can show you data which should leave no doubt in your mind that a MIKRO-COLLECTOR can handle your job economically and efficiently, if it falls in either of these classifications:

1—*Elimination of atmospheric pollution, regardless of the dangerous or noxious quality of the dust, or the minute size of the dust particles.*

2—*Full recovery of a valuable product.*

This is made possible by the MIKRO-COLLECTOR's pressed felt filter medium and its Hersey reverse-jet cleaning ring, which assure the very highest possible dust recovery.

10 Reasons

why a MIKRO-COLLECTOR will best help you win a war with Dust

1. Phenomenal Filter Rates
2. Highest possible recovery of solids
3. Require less filter surface, floor area
4. Extreme simplicity, low upkeep, minimum attention
5. Selected wool felt filtering medium
6. Reduced number of filter bags; quick changeover
7. Continuous, fully automatic operation
8. Uniform air flow
9. Easy handling of dust loads, damp or dry
10. Thorough survey and diagnosis of dust problem

SEND FOR—actual sample of felt used in MIKRO-COLLECTOR.

*Patents applied for by H. J. Hersey, Jr. and Pulverizing Machinery Company

PULVERIZING MACHINERY COMPANY
24 Chatham Road Summit, New Jersey

MIKRO-COLLECTOR 100 PERCENT
By the makers of
MIKRO-PULVERIZERS and MIKRO-ATOMIZERS

WHERE TO BUY

Featuring many cost-cutting products to help solve production problems

STICHT FOR TACHOMETERS

HERMAN H. STICHT CO., INC.
27 PARK PLACE N.Y.C.

BALDWIN-HILL INSULATIONS

INDUSTRIAL INSULATION

A complete line of Mineral Wool Insulations for service from Sub-Zero to 1800° F.
Mono-Block, Felts, Blankets, Koldboard, Pipe Covering
B-H No. 1 Cement
B-H Powerhouse Cement

BALDWIN-HILL COMPANY
400 Breunig Ave. Trenton, N. J.

Protectoseal Fusible Link
WASH AND DIP TANKS
F. M. Approved

For safe, convenient washing and cleaning of small parts. Fusible link melts, drops cover automatically in case of fire. Features include electric-seam-welded, leak-proof terne plate body . . . squarish design for stability . . . rounded corners for easy cleaning . . . full length hinge on cover for rigidity. Sturdy metal basket for agitation-washing included with Wash Tank but not with Dip Tank. Capacities from 3 pints to 12½ gallons.

THE PROTECTOSEAL COMPANY
1962 S. WESTERN AVE. • CHICAGO 8, ILL.

This
WHERE TO BUY
Section

supplements other advertising in this issue with these additional announcements of products and services essential to modern plant management and maintenance. Make a habit of checking this page, each issue.

DEPARTMENTAL STAFF

FACTORY MANAGEMENT & MAINTENANCE

MISCELLANEOUS EQUIPMENT

Begins on page 192

Automatic Lubricator for Trolley Conveyors

The Fauver people have designed an enclosed conveyor lubricator for use in foundries or other locations with unusual amounts of dirt, dust, or spray in the air. The new unit is a self-contained, grease-type lubricator. It is operated by contact of the trolley wheels of the conveyor.

As each trolley wheel approaches the lubricator, the wheel hub engages the sleeve of one of five pumping units. Continued rotation of the wheel forces out a measured quantity of grease to the wheel bearing.

J. N. Fauver Co., Inc., 49 W. Hancock, Detroit 1.

1000-WATT FILMSTRIP PROJECTOR takes slidefilms out of the classroom into the auditorium, claims the DuKane Corp., St. Charles, Ill. The new projector provides larger, brighter pictures than previous models. Projector can be controlled by electric pushbutton. Or you can connect it to an automatic amplifier and 3-speed turntable for fully automatic slidefilm projection.

EXPLOSION - PROOF GERMICIDAL LAMP can be used safely in hazardous atmospheres. Unit made by Hanovia Chemical & Manufacturing Co., 100 Chestnut St., Newark 5, N. J., sprays airborne bacteria with death-dealing ultra-violet rays. You can mount it on wall or ceiling for direct or indirect radiation.

Pipe Repair CLAMPS

Made for every type of leak—any temperature or pressure. Send for Catalog No. 41-0.
M. B. SKINNER CO., SOUTH BEND 21, INDIANA

ALLEN AS IT SINCE '32 1950

FLUX
for
SODERING
SILVER SODERING
WELDING
BRAZING

L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

STOP DUST

DUSTKOPS — **22 Models**
UNIT TYPE — 300 cfm to 10,000 cfm
LOW COST — ¼ hp to 15 hp.

AVAILABLE FROM STOCK
For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS
Send for Cat. 605I; describe problem for recommendation by return mail, without obligation
AGET-DETROIT CO. • ANN ARBOR, MICH.

INCREASE EFFICIENCY OF STANDING WORKERS

It's a known fact that TIRE LINK CUSHION MATS reduce fatigue and increase the efficiency of standing workers.
These soft, durable, low cost mats insure maximum comfort and safety for standing workers—end leg and ankle fatigue and keep the worker rested.
Made in any size to your specifications. Write today for information and prices.

ASHLAND RUBBER MAT CO.
P. O. Box 167 Ashland, Ohio

FIRE CHIEF ALARM is an amazing new fire detector that warns of fire! Quickly and easily installed, it protects everywhere . . . in the home, office, factory, shop, garage, warehouse, barn, store. At the outbreak of a fire, the "Fire Chief" bell rings before any extensive damage can be done and warns in time for safe exit.

Only one Fire Chief unit is needed for the entire premises . . . wherever the fine inconspicuous wire is placed, there you will have positive fire alarm protection.

Every unit is tamperproof. There is nothing to wear out and no batteries to replace . . . unit will last indefinitely! It's tested, proven and constantly on the alert to peril from fire.

Everyone needs fire security! Order Fire Chief today—at this extremely low cost!

Complete unit with 100' of wire and 10 fire sensitive elements . . .

$12.00 ppd.

Extra 6 elements and 100' wire $2.00

Order Today or Write for Literature!

Dept. FM-1

Heat-Timer Corp.

520 BROADWAY • NEW YORK 12, N. Y.

Scrap iron and steel supplies are again running short of the amounts needed to maintain the present high level of steel production.

You're asked to search out the idle iron and steel in your plant and yard . . . and turn it over to your local scrap dealer.

Be sure to include obsolete machinery, un-used jigs and fixtures, gears, pulleys, chains, pipe and other equipment . . . non-ferrous scrap is needed now, too!

DON'T DELAY...

GET IN THE SCRAP NOW!

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET • NEW YORK 36, N.Y.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • **OPPORTUNITIES** • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

POSITION WANTED & INDIVIDUAL SELLING OPPORTUNITY undisplayed advertising rate is one-half of the above rate, payable in advance.

PROPOSALS, $1.50 a line an insertion.

INFORMATION:

BOX NUMBERS care of publication count as 1 line additional.

DISCOUNT of 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals.)

EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE:

The advertising rate is $18.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches —to a page.

F.M.M.

NEW ADVERTISEMENTS received by Jan. 16th at the N. Y. office, 330 W. 42 St., N. Y. 36, will appear in the Feb. issue, subject to limitation of space available.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

INDUSTRIAL ENGINEER Wanted. Five years industrial engineering experience with a degree in either mechanical or industrial engineering. Position will involve developing industrial engineering techniques in large woodlands operations. Apply P.O. Box 241, Atlanta, Georgia, giving usual information called for in employment application.

PLANT ENGINEER with chemical, industrial or mechanical engineering degree and 4 to 5 years' experience as an operating engineer to supervise 30 employees and two foremen. Responsible for boiler house, building and machinery maintenance and engineering. Excellent opportunity for Junior Engineer. Send complete resume to P-2766, Factory M.&M.

Additional Positions Vacant Ads on pages 365 & 366

SELLING OPPORTUNITY OFFERED

SALESMEN WANTED who are calling on Industrial plants to carry plastic shop ticket holders and ring book envelopes as sideline, for manufacturer. Good Commission. David Calvin Co., LeRaysville, Pa.

EMPLOYMENT SERVICE

SALARIED PERSONNEL $3,000-$35,000. This confidential service, established 1927 is geared to needs of high grade men who seek a change of connection under conditions assuring if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. D, 241 Orange St., New Haven, Conn.

(Continued on page 366)

SALARIED POSITIONS $3,500 — $35,000

We offer the original personal employment service (established 42 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars.

R. W. BIXBY, Inc. 276 Dun Bldg., Buffalo 2, N.Y.

POSITIONS AVAILABLE

President & Gen. Mgr. Heavy Mfg. $25,000; Plant Manager Stampings $20,000; Works Mgr. Automotive $15,000; Supt. of Maint. Heavy Conveyors $13,000; 2 Manufacturing Engrs. $9-$12,000. Write for application and learn of opportunities available now. Specialists in executive and tech. men since 1915. Confidential. Employers pay fee most cases.

HARRISON PERSONNEL SERVICE
20 W. Jackson Blvd. Chicago 4

EXECUTIVES AND TECHNICAL MEN

Desiring Positions with Stability

We solicit inquiries from qualified candidates who desire to contact employers for positions paying $5000 to $25,000 per year. Confidential Est. 30 years.

(Inquiries from Employers entail no obligation)

THE NATIONAL BUSINESS BOURSE
20 W. Jackson Blvd., Chicago 4

UPPER INCOME EXECUTIVES. $5,000-$50,000, seeking positions in California or anywhere in the USA write for outline of highly personalized confidential service. No obligation—your identity protected.

ALBERT L. WALTERS ASSOCIATES
Los Angeles-San Francisco, Executive Career Specialists serving Western Industry. Est. 1944. Mail to 1211 de Young Bldg., San Francisco 4

MECHANICAL SUPERINTENDENTS
and
FIELD ENGINEERS—MECHANICAL

The Austin Company plans to give special training to a limited group of high type young men who have had practical experience in the installation of Mechanical Equipment for heating, air conditioning, ventilating systems, boiler room equipment, controls, process piping, sprinkler systems, plumbing, and sewer work for large new industrial plants.

This group will be placed in a training course at our Cleveland headquarters after which assignments will be made to our eight regional districts for supervisory positions in the field.

Instructions in Mechanical Equipment, installations for modern industrial plants will be given by our engineering and field staffs, and will include a review of the broader phases of our business.

Full compensation and reasonable expense allowance will be furnished during the training course.

We have an established vacation plan, also paid holidays.

Please give full particulars as to age, experience, education, and salary desired in first letter, and enclose a recent photograph.

THE AUSTIN COMPANY

16112 EUCLID AVENUE **CLEVELAND 12, OHIO**

PRODUCTION MANAGER

Excellent opportunity for aggressive man to take charge of processing division in old line food company in Boston area. Prefer man experienced in chemical, food, confectionery, dairy or similar industries. Require Industrial Engineering degree or experience, in addition to production supervision experience. Unlimited future for a creative thinker who is aggressive and has a sound knowledge of scientific management principles. Give full details including salary desired in first letter.

P-2818, Factory Management & Maintenance
330 W. 42nd St. New York 36, N. Y.

PLANT ENGINEER

Plant engineer with chemical, industrial or mechanical engineering degree and 4 to 5 years' experience as an operating engineer to supervise 20 employees and two foremen. Responsible for boiler house, building and machinery maintenance and engineering. Excellent opportunity for Junior Engineer. Send complete resume to **P2743 Factory Management & Maintenance, 520 N. Michigan Ave., Chicago 11, Ill.**

WANTED

TWO MEN enough interested in "Tomorrow" to answer this advertisement "Today."

It's strictly against the policy of this midwest industrial rubber products manufacturer to go outside its own organization for executive personnel, but a new plant addition for the manufacturing of wire-braid, lead press hose makes this move necessary.

We need two men to head up this program

an
EXPERIENCED CHEMIST
and a
HOSE DEPARTMENT SUPERINTENDENT

The men selected must have had considerable experience in the production of wire-braid, lead press hose, plus the ability to start from scratch with a new building and new equipment to build a high quality product.

If you qualify for either of these positions . . . and want to build a future in a medium-size midwestern city . . . write us now. Give us full facts about your experience, age, education and salary requirements.

P-2628, FACTORY MANAGEMENT AND MAINTENANCE
520 N. MICHIGAN AVE. **CHICAGO 11, ILL.**

PLANT ENGINEER

Large Eastern Paper Mill with extensive wood pulp and chemical operations is seeking an experienced Plant Engineer. Will be responsible for all plant engineering functions. Paper Mill experience not essential. Engineering degree required. Salary dependent upon qualifications. Company is located in small city with desirable schools and living conditions. Immediate area unsurpassed in natural beauty, hunting and fishing. This large mill is affiliated with a large nationally known company of excellent character and top financial rating. This is an unusual opportunity. Your reply held in confidence.

P-2751, FACTORY MANAGEMENT & MAINTENANCE
520 N. Michigan Avenue **Chicago 11, Ill.**

WANTED
REPRESENTATIVE TO SELL

A volume line of staple articles of Steel and Brass with continuous repeats, direct to R.R., Utilities, O.E.M. etc.
State Lines, type trade and territory.

RW-2633, Factory Management & Maintenance
330 West 42nd St., New York 36, N. Y.

EMPLOYMENT SERVICES

(Continued from page 364)

EXECUTIVES—CONTEMPLATING a change? Your personal requirements met thru our flexible procedures, affording full protection of your present position. We have the know-how and the nationwide contacts to negotiate successfully for you. Details on request, mailed under confidential cover. Jepson Executive Service (Est. 1939), 1044 Porter Bldg., Kansas City 2, Mo.

POSITIONS WANTED

ASSISTANT TO Works Manager, presently employed in large metalworking factory desires new connection in similar capacity or as Industrial Engineer. Age 38, six years experience as methods and process engineer, time study man, industrial engineer, production control systems, assistant to purchasing. Will to relocate anywhere. PW-2808, Factory M.&M.

AVAILABLE. MARRIED man 47 years old. B.A. Degree. 20 years experience in factory and office incentives; M.T.A.; job evaluation; cost control; general administration. Desire change to small or medium plant as chief industrial engineer, time study head, or other capacity where qualifications can be used to our mutual benefit. PW-2806, Factory M.&M.

CHEMICAL ENGINEER, 1941, desires position with progressive company located in medium sized city in Indiana or surrounding states. Varied engineering experience; mostly mechanical. PW-2682, Factory M.&M.

EXECUTIVE ASSISTANT—15 years in large automotive parts Division. Tooling, methods, Engineering small parts for large volume assembly. Excellent record in Cost reduction. PW-2833, Factory M.&M.

MAN WITH General business background, plus economic and legal experience and training, seeks challenging employment in business with long range opportunities. Paul L. Harris, 500 Maple Street, Shenandoah, Iowa.

YOUNG TOP-Notch production executive available. Prefers N.E. Salary $25,000 plus bonus. PW-2529, Factory M.&M.

SPECIAL SERVICE

Time Study Equipment

Boards with U.C.E.Z. transparent watch holders. Stop Watches. Pedometers, Slide Rules. Time Study forms in stock. Sample kit free. Oznam Products Co., 5544 So. Homan Ave., Chicago 29.

NEW CONVEYOR
US Patent Rights For Sale

Only powered conveyor that can be switched like now-powered conveyors. Patent copies on request.

BO-2565, Factory Management & Maintenance
330 West 42 St., New York 36, N. Y.

PLANT FOR SALE

Newark, N. J. Three-story brick building 71,000 sq. ft. Brick garage 10,000 sq. ft. Buildings—sprinkler throughout—2 freight elevators—heating system—loading dock 185 ft.—yard 6,000 sq. ft. 3 steam engines @ 550 K.W., 110 V. D.C.—two Diesels 20 and 40 K.W.—Boiler #1 @ 750 BHP, Boiler #2 @ 900 BHP, 160 lb. rtd. cpty. each. Softest water in state, low taxes, plentiful local labor, easily accessible to varied communities. Only substantial inquiries invited.

BO-2775, FACTORY MANAGEMENT & MAINTENANCE
330 W. 42nd St., New York 36, N. Y.

CLOGGED DRAINS?

Tree Roots — Hard Grease — Rust — Rags, Etc. Can be removed easily from 2"-6" sewers with our 1A Electric Drain Cleaner.

Write for Catalogue

ELECTRIC SEWER CLEANING COMPANY
Boston 34 Massachusetts

TRADE WITH BAUER
BUY - SELL - TRADE *your*
COMPRESSOR VACUUM PUMP STEAM BOOSTER
L.W.BAUER
265 ESSEX AVE. BLOOMFIELD, N.J.

#1 & #2 WINDERS

FOR SALE: 4—12" diameter drums, 92" face with 2-15/16" babbitted type pillow block bearings complete with cast iron frames, chain and belt drives, 8" Moore & White low speed clutch, 20" Moore & White high speed clutch (less motor) winder tape feed and 3 complete sets of Koegel's slitter top and bottom knives.

FS-2650 Factory Management & Maintenance
330 West 42nd St., New York 36, N. Y.

BOOKS

THE FATIGUE ALLOWANCE IN INDUSTRIAL TIME STUDY
by MATTHEW A. PAYNE

66 page booklet believed to be the most comprehensive treatment of the fatigue allowance in print. $2.50 plus 6¢ postage in U.S.

ORDER DIRECT—M. A. PAYNE CO.
1352 CROYDEN RD., CLEVELAND 24, O.

TRANSFORMERS
FOR SALE

1 Phase, 60 Cycle

3—500 KVA G-E 66000—2300
2—500 KVA W-H 13200—240/480
3—400 KVA W-H 13200—600/575/550
1—400 KVA G-E 13200—120/240 Pyranol
3—333 KVA G-E 44000—6600
3—250 KVA W-H 13800—2300
3—200 KVA G-E 13200—120/240
3—250 KVA Kuhl 6600—575
3—150 KVA G-E 44000/33000—2400/500
3—150 KVA Pitts 22000—575
3—150 KVA G-E 19050/33000Y—2540/2300
3—150 KVA A-Ch 13800—2300
3—100 KVA G-E 33000—6900/11950Y
3— 50 KVA G-E 33000—2400/4160Y
3—100 KVA G-E 2400—240/480, 25 cycle

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.
CINCINNATI 27, OHIO

BAL *for NEW and USED* MACHINE TOOLS
BALL MACHINERY CO.
713 W. LAKE STREET, CHICAGO 6, ILLINOIS
BOUGHT AND SOLD

AIR COMPRESSORS
VACUUM PUMPS
REBUILT BY AMERICAN
GET BETTER FOR LESS

Your Choice	STATIONARY	PORTABLE
American	Horizontal	Gasoline
Bury	Vertical	Diesel
Chicago Pneu	Electric	Pneu Tires
Curtis	Steam	Skids
Davey		Steel Wheels
Gardner Denver		
Ingersoll Rand		
Le Roi		
Pennsylvania		
Schramm		
Sullivan		
Worthington		

FOR SALE—FOR RENT

FOR RENT—ANY ONE OF OVER 200 COMPRESSORS IN STOCK

Since 1902
AIR RECEIVERS - AFTERCOOLERS
AMERICAN AIR COMPRESSOR CORP.
4700-4800 Dell Ave. No. Bergen, N.J.

TRANSFORMERS
STOCK SHIPMENT
1 KVA—7500 KVA
— SPECIAL —
100 15 KVA Air 440/220—110/220
CASH FOR YOUR SURPLUS

ELECTRIC EQUIPMENT CO.
P. O. Box 51, Rochester, N. Y.
WORLD'S LARGEST INVENTORY
MOTORS • GENERATORS • TRANSFORMERS

LIQUIDATION

--ELECTRICAL EQUIPMENT & PUMPS--

ELECTRIC MOTORS

2—Wagner Elec. Corp. 150 H.P. Type RS1, Frame 35K, RPM 575, 440 volt, 3 ph., 60 cycle, 193 amp.

1—GE 30 H.P. Model 16649, 3 phase, 60 cycle, 220 volt, 1165 RPM.

1—GE, 25 H.P., Frame 365, 220/440 v., 3 phase, 60 cycles, 1760 RPM.

1—GE 25 H.P., 220 v., 60 cy, 1165 RPM.

1—GE 25 H.P., Frame 405 BZ, 220/440 v., 3 ph., 60 cy. 1170 RPM.

1—Star 25 H.P. 220/440 v., 3 ph., 60 cy. 1750 RPM.

1—Star 25 H.P. 220/440 v., 3 ph. 60 cy. 1750 RPM.

1—Star—Type A67, 25 HP, 220 v., 65 amps., 3 ph., 60 cycles, 1750 RPM.

1—Louis Allis Co., 30 H.P. wound rotor induction 220/440 v., 3 ph. 60 cycle, Type OCH, Frame 444, Class 3D, form B. 1165 RPM.

Others down to 1 H.P. all speeds

CABLE & WIRE

41,000 ft. Cable, Parkway, Hazard, 3 cond. #2, Standard, 2300 volt.

1,000 ft. Cable, Parkway #4/0—3 cond. Type RR, 600 volt.

1,500 ft. Cable, 4 cond. #6 Type W, 600 volt.

1,000 ft. Cable, 4 cond. #4 Type W, 600 volt.

63,000 ft. Wire, #4—7 Strand, Type TW.

31,000 ft. Wire, #8—Solid Type TW.

3,000 ft. Wire #12 Solid, Type TW.

Assorted connectors, clamps, insulators, cut outs, complete inventory of fittings.

LOCOMOTIVES BATTERIES AND CHARGING UNITS

16—Locomotives, Storage Battery, Greensburg Machine Co. "Cruiser" Type, 24" Gauge convertible to 36" ga., 2 Motor Drive, Timken Journals and Steel Wheels, Battery Box included. Speed light 7 MPH, Speed loaded 4 MPH.

32—Batteries, Exide Ironclad Storage, Type TLM, 48 Cell, 19 Plate, equivalent to 41.712 KW.

2—Batteries, Exide, Storage, Type TLM, 15 Cells, 17 Plates, 400 Amp. 11.59 KWH.

15—Battery charging units—10-20-25-30 K.W. with charging panels.

All batteries thoroughly reconditioned and fully charged.

POWER EQUIPMENT 220-440-2300 Volt

259 SAFETY SWITCHES 30-600 AMP.

123 MOTOR STARTERS

1—100 HP—with Auxiliary Equip.

Line Pole, Transmission Protective, Equip. Fittings, Lugs & Clamps. Circuit Breakers, Fixtures & Industrial Supplies.

TRANSFORMERS

86—5 KVA Dry Type 2300-480/240 Volt, 1 phase, 60 cycle

PUMPS FOR ALL TYPES OF SERVICE

5—I-R. Model 4GT2 capacity 1000 GPM at 1000 ft. head. 350 H.P.

2—Multi-stage, Worthington, Model 4 UR-1, 500 GPM at 1800 ft. head. 350 H.P.

1—Worthington, 4", Model 4 UQ-1, 500 GPM/1000' head. 200 H.P.

1—Worthington, Reciprocating Power, Size 6 x 10M. 200 H.P.

1—Worthington, Model 1½ U1 with 10 HP Motor.

2—Centrifugal—American, Size 5" suction, 4" discharge, 2 stage, 1760 RPM. Capacity 750 GPM at 400' head. 125 H.P.

1—Centrifugal, American, 5" suction, 4" discharge, 2 stage, Type BE, 750 GPM at 400' hd. 100 H.P.

3—Worthington, Reciprocating Power Pumps, Size 4½x10 M, 100 H.P.

2—Centr., Weinman JC, 2 stage capacity 500 GPM/400' hd., 5" suction, 3" discharge, at 3450 RPM. 75 H.P.

1—American—4"x3", 2 stage high hd., 500 GPM/300 ft. hd. 50 H.P.

2—Centr., American—high hd., 2 stage, Size 4"x3" 500 GPM at 290' hd. 50 H.P.

1—I-R Model 2 MRV-40, 2 stage 3450 RPM, 250 GPM/320 ft. hd. 40 H.P.

2—Centr., I-R, Type 2 MRV-40, 250 GPM at 400' hd. 40 H.P.

1—Centr., Weinman 8"x8" Model JC 2 stage horizontally split type centrifugal pump, 5" suction, 3" discharge, 500 GPM/215 ft. hd. 40 H.P.

1—I-R Size 1½ MVR 25, 100 GPM, 520' hd. 25 H.P.

2—Centr. Weinman, K25-2, Type K, single stage close coupled Unipump, 3" suction, 2½" discharge, 300 GPM/215 ft. hd. 25 H.P.

10—Sludge, Chicago Pneumatic Cp-7, at 90 p.s.i.—50 GPM/75' hd.

2—Deep Well, Deming, Turbine, 23 GPM against 40 lb. discharge pressure at hd. 2 H.P.

1—Grout, Gardner Denver, Model EF-FS, Duplex Horizontal—10"x 3"x10"—cap. 1000 lbs. end pressure.

1—Grout, Gardner Denver, Model FS-1, Duplex Horizontal — Size 10"x3"x10", cap. 1000 lbs. end pressure.

1—Centr., Gorman-Rupp, Model B14A, Size 4"—750 GPM/10' hd. 25 H. P.

1—Gasoline, Gorman-Rupp, 3" self-priming centrifugal, Model 3302, Air Cooled Engine (gasoline), Model AHH. 9 H.P.

7—Centr., Gorman-Rupp, 3"—Model 332 (E-13)—325 GPM/10' hd. 5 H.P.

2—Centr., Gorman Rupp, Model 1223, Size 2, 2" discharge, 2" suction, 186 GPM/10' hd.

1—I-R, 2 stage 50 HP, Model A 235 GPM—500' hd.

1—I-R, Model A, 1740 RPM, 200 GPM/96' hd. 7½ H.P.

6—Air—I-R (Cameron), Size 5-7x7x 13LSS.

1—Air—I-R (Cameron), Size 1-4x4x 7 LSS.

1—Centr., Jaeger, Model 3XP, 3" with Wis. Gasoline Engine, Model AEH.

1—Centr., Jaeger, Model 1½ PE, ¾ HP, 1½" suction, 1½" discharge, Cap. 25 GPM/30' hd.

1—LaBour, Size 2—Type DTM. 5 H.P.

1—Le Courtenay, Type 8"—B2, 1750 GPM at 87 ft. hd. 75 H.P.

10—Centr., Sterling, 3" suction, 3" discharge, self-priming Model 70E. 245 GPM/40' hd. 5 H.P.

1—Pump, Viking, Size 1"—Model ZHCH.

LURIA BROTHERS and COMPANY, INC.

EQUIPMENT DIVISION

BALTIMORE FIELD OFFICE RT. 26 RANDALLSTOWN, MD. P.O. BOX 440: Phone ROslyn 1406

LINCOLN LIBERTY BUILDING PHILADELPHIA, PA. Phone Rittenhouse 6-7455

INDUSTRIAL CONSULTANTS

R. M. BATHURST
Registered Professional Engineer
Industrial Studies—Management Reports
PROJECT DEVELOPMENT
801 West 15th St., Tyrone, Pennsylvania
Phone 1574-M

THE EMERSON ENGINEERS
Management Consultants Since 1899
Better Use of Manpower
New York 20, N. Y. Los Angeles 38, Cal.

GEMAR ASSOCIATES
Materials Handling Consultants
Warehousing — Plant Layout
Production Handling
Greenwich Connecticut

HUBBARD, DILLEY & HAMILTON, INC.
Industrial and Management Consultants
ORGANIZATION — WAGE INCENTIVES
PRODUCTION — COST REDUCTION
SALES RESEARCH — JOB EVALUATION
527 Fifth Avenue New York City, N. Y.

If you have a plant management problem, contact the appropriate consultants whose cards appear on this page. The offering of their special services nationally, justifies your confidence in their ability to give you competent counseling that can effect appreciable SAVINGS for you.

LESTER ASSOCIATES, INC.
Designers and Manufacturers of
TRAINING DEVICES—VISUAL AIDS—
INDUSTRIAL PLANNING MODELS—
RELIEF MAPS AND
ANIMATED FLOW CHARTS
24 Aqueduct Lane, Hastings-on-Hudson, N. Y.
HAstings 5-4454—4828

METHODS ENGINEERING COUNCIL
H. B. MAYNARD, President
Consultants in Industrial Management
718 Wallace Ave.—Pittsburgh 21, Pa.

ALLAN H. MOGENSEN
Director
Work Simplification Conferences
330 W. 42nd Street Box 30
New York City Lake Placid, N. Y.

R. M. MUCH and ASSOCIATES, Inc.
Consultants
Materials Handling from end to end.
161 Devonshire Street, Boston, Mass.
We do not sell equipment
MUCH
"There is nothing like ∧ experience"

W. W. SLOCUM & CO.
Engineers
Industrial—Design—Management
744 Broad St., Newark 2, N. J.

H. H. WHITCOMB
Director
Coordinated Planning
a Program to Balance
Sales, Production & Costs
Littleton, Mass.

FACTORY

offers a management tool you can use . . .

. . . to get ideas across to a large number of plant people
. . . to train workers and supervisors
. . . to promote your company's products
. . . to build your reference library

These reprints are authoritative and geared for easy reading by busy executives. 35c each

MAIL THIS COUPON

Editor, FACTORY 1-52
330 West 42nd St., New York 36, N. Y.

Please send me .... copies each of the reprints represented by the numbers circled, at 35¢ per copy, I enclose check ( ), money order ( ), for

$.....

Name .....

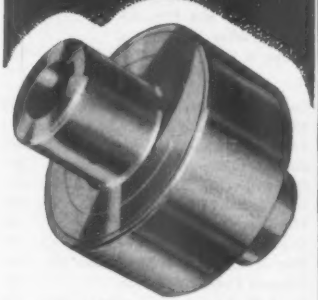
Address .....

City ..... Zone ..... State .....

9, 15, 38, 45, 47, 86, 96, 99, 101, 102, 103, 106, 107, 109, 111, 112, 113, 115, 117, 118, 119, 120, 121, 125, 126, 127, 128, 129, 130, 131, 133, 134, 135, 136, 137, 138, 139

9. Motion Economy
15. Plant Layout
38. How to Rate Jobs and Men
45. Foremanship Fundamentals
47. The Foreman on His Job
86. Motion-Time Standards
96. Air Conditioning
99. Lubrication
101. Your Electric Motor
102. When Foreman Deals With Worker
103. Fire-Fighting Equipment
106. Better Vision for Greater Efficiency
107. Revamping Electrical Distribution Systems
109. Methods-Time Measurement
111. What Electric Distribution System for Your Plant
112. The Management of Maintenance
113. Principles of Maintenance Control
115. Profit Sharing Plans in Industry
117. How to Plan and Run Open House
118. Painting the Plant
119. How to Organize for Cost Reduction
120. Electric Motor Controls
121. Telling Employees Why Costs Must Be Cut
125. Adopting the Best in Plant Layout
126. Providing Favorable Working Conditions
127. Make Your Plant a Safe, Pleasant Place to Work
128. Providing the Best in Employee Training
129. Keep Your Plant Up—Keep Your Costs Down
130. Plan and Control Production
131. Making Fullest Use of Mechanical Service Equipment
133. Wage Incentives
134. Better Handling—a $2-Billion Target
135. How Good Is MTM?
136. How to Get Your Maintenance Money's Worth
137. How to Build a Maintenance Program Now to Fit the National Emergency
138. Better Handling: Best Way to Save Manpower, Speed Production
139. Maintenance Control That Really Controls

IMPROVE ANY MOTOR DRIVE



RAWSON COUPLINGS

—give motors a cushion start free of external load. Motors can be selected for running instead of starting load.

— provide protection against overload. They automatically limit the torque at any given speed.

Only Rawsons are adjustable on the job for changing drive requirements . . .

USE THE MOTOR YOU HAVE WITH A RAWSON

Full range of capacities — fractional to 2500 horse power.

CENTRIC CLUTCH COMPANY
P. O. BOX 175
MAIN ST. & STATE ROUTE 35
WOODBRIDGE, NEW JERSEY
1898

CONDITIONED AIR HELPS BUILD BETTER ENGINES

Have you considered how air conditioning may also improve *your* business operations?

In the precision job of assembling automotive engines, close tolerances require carefully controlled conditions of temperature and humidity. In addition, cleanliness of all internal parts must be preserved.

To assure *both* cleanliness and proper atmosphere, a midwest manufacturer installed a sealed enclosure some 200 feet in length within the plant. The enclosure is fitted with an air conditioning unit operated with "Freon" safe refrigerants. Filtered air is supplied under pressure through a system of multiple duct outlets and the entire area is thus maintained free from dust and dirt. Temperature remains constant at 70° F.—permitting the selective fitting of various precision parts. This temperature also provides comfortable working conditions. Result: better engines.

There are scores of ways in which air conditioning and refrigeration, too, are now helping American industry to produce better products . . . easier . . . faster . . . and at lower cost. Witness the hundreds of far-seeing businesses which have installed new air conditioning and refrigeration equipment in their plants. Witness as well the many more that are now looking into the benefits of air conditioning and refrigeration . . . discussing the subject with their engineers . . . determining for themselves how these two aids to industry can best be applied to their specific needs.

Why not talk it over with your own engineers soon? When you do . . . be sure to inquire about equipment utilizing "Freon" refrigerants. "Freon"-charged machines are widely preferred . . . widely used in all types of installations because "Freon" refrigerants are safe, dependable, of uniform quality and meet building code requirements everywhere. E. I. du Pont de Nemours & Co. (Inc.), "Kinetic" Chemicals Div., Wilmington 98, Delaware.

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

KINETIC

FREON

SAFE REFRIGERANTS

"Freon" is Du Pont's registered trade-mark for its fluorinated hydrocarbon refrigerants.

Index To Advertisements

This index is a service to readers. Every effort is made to maintain its accuracy, but FACTORY MANAGEMENT and MAINTENANCE assumes no responsibility for errors or omissions.

Acme Industries, Inc. 256
Acme Steel Company 326
Adam Electric Co., Frank 257
Aget-Detroit Company 363
Ahlberg Bearing Company 224
Air Express Division, Railway Express 169
Airtherm Manufacturing Co. 190
Alemite Division of Stewart-Warner 141
Allen Co., Inc., L. B. 363
Allen Ventilator Division, Production Planning Co. 294
Allis-Chalmers Mfg. Company 9, 30, 31, 46, 47
Alloy Rods Company 357
Alvey-Ferguson Company 160
American Abrasive Metals Co. 280
American Air Filter Company 272
American Airlines, Inc. 151
American Bitumuls & Asphalt Company 333
American Blower Corporation 62
American Brake Shoe Corp. 195
American Coolair Corp. 198
American Crayon Company 360
American Felt Company 18
American Marietta Company 354
American Gas Association 331
American Mat Corporation 260
American Monorail Company 338
American Optical Company 336
American Screw Company 21, 229
American Wheelabrator & Equipment Corp. 238
Amplex Mfg. Co., Subsidiary of Chrysler Corp. 275
Anaconda Wire & Cable Company 303
Anchor Post Fence Div., Anchor Post Products, Inc. 356
Angier Corporation 334
Ansul Chemical Company 194, 220
Apex Machine & Tool Co. 359
Appleton Electric Company 248
Arrow, Hart & Hegeman Electric Company ..... Insert 160, 161
Ashland Rubber Mat Co. 363
Atlantic Screw Works, Inc. 229
Atlas Fence Company 358
Automatic Company 15

Bakelite Company Div. of Union Carbide & Carbon Corp. 354
Baker-Raulang Company 7
Baldwin-Hill Company 363
Barreled Sunlight Paint Co. 19
Barrett Div., Allied Chemical & Dye Works 301
Bassick Company 335
Behr-Manning 265
Binks Manufacturing Company 246
Birmingham Committee of 100 278
Black & Decker Mfg. Co. 313
Blackhawk Mfg. Co. 200, 201
Blake & Johnson Company 229
Blanchard Machine Co. 213
Bostitch, Inc. 183
Boston Woven Hose & Rubber Co. 339
Bradley Washfountain Co. 282
Brainard Steel Company 199
Brighton Screw Mfg. Co. 175
Brown & Sharpe Mfg. Co. 48A
Bruning Company, Inc., Charles 217
Buffalo Fire Appliance Corp. 235
Bulldog Electric Products Co. 232, 233
Bunting Brass & Bronze Co. 270
Buschman Co., Inc., E. W. 300
Bussman Mfg. Co. 38, 39

Cadillac Plastic Company 198
Cambridge Wire Cloth Co. 170
Camcar Screw & Mfg. Corp. 229
Carborundum Company 44, 45
Carboloy, Dept. of General Electric Co. 341
Carey Mfg. Co., Philip 240
Carrier Corp. 58
Centric Clutch Company 369
Central Screw Co. 229
Century Electric Company 255
Certified Equipment Mfrs. 290
Chicago Hardware Foundry Co. 328
Chicago Pneumatic Tool Co. 347
Chisholm-Moore Hoist Corp. 320
Clark Equipment Company Industrial Truck Div. 65
Clements Mfg. Co. 266
Cleveland Crane & Engineering Co., Cleveland Tramrail Div. 32, 33
Cone Automatic Machine Co., Inc. 20
Continental Screw Co. 229
C-O-Two Fire Equipment Company 242
Crane Company 17
Curtis Pneumatic Machinery Div., Curtis Manufacturing Co. 279

Darnell Corporation, Ltd. 284
Day-Brite Lighting Co. 353
Dayton Rubber Co. 214, 215
De Laval Separator Co. 48D
De Laval Steam Turbine Co. 325
Delta Power Tool Div., Rockwell Mfg. Co. 14
Detecto Scales, Inc. 330
Diamond Chain Company, Inc. 205
Dockson Corporation 154
Dodge Mfg. Co. 311
Doepke Mfg. Co., Inc., Chas. Wm. 330
Doerr Electric Corporation 216
Dow Chemical Company Pentachlorophenal Div. 182
Dow Chemical Company Saran Lined Pipe Div. 337
Dow Corning Corporation 143
Dracco Corporation 206
Durkee-Atwood Company 52
du Pont de Nemours & Co., E. I. "Kinetic" Chemicals Division 369

Eagle-Lock Company 229
Edison Storage Battery Div., Thomas A. Edison, Inc. 230
Edmont Manufacturing Company 244
Elco Tool & Screw Corp. 229
Electric Storage Battery Co. 135
Elliott Company (Crocker-Wheeler Div.) 218, 219
Enterprise Paint Mfg. Co. 346
Elwell-Parker Electric Co. 13
Evans & Company 254

Factory Management & Maintenance 368
Farval Corporation 372
Feedrail Corporation 48
Fenwal Incorporated 221
Finnell System, Inc. 203
Flexible Steel Lacing Co. 305
Flintkote Company 349
Foote Bros. Gear & Machine Corp. 53
Fort Worth Steel & Machinery Co. 345
Fostoria Pressed Steel Co. 298
Food Machinery & Chemical Corp. 291

Gates Rubber Co. 153
Gaylord Container Corp. 293
General Box Company 156
General Electric Company (Apparatus Dept.) ..... Insert 16, 17, 26, 27, 42, 43, 155, 181, 227, 318
General Electric Company (Lamp Dept.) 289
Goodrich Company, B. F. 1, 6, 177
Goodyear Tire & Rubber Co. 10
Gould National Batteries, Inc. 207
Graton & Knight Company 247
Graybar Electric Company 5
Great Lakes Screw Corp. 229
Great Lakes Steel Corp. (Stran Steel Div.) 317
Grinnell Company, Inc. 281
Gulf Oil Company 63

Handling Devices Co., Inc. 342
Hansen Manufacturing Company 269
Harnischfeger Corporation 157, 231
Harper Co., H. M. 229
Heat Timer Corp. 364
Hein Werner Corporation 178
Hewitt Robins, Incorporated 312
Holcomb Mfg. Co., J. I. 295
Homestead Valve Manufacturing Co. 239
Hood Rubber Company 342
Hudson Pulp & Paper Corporation 261
Hyatt Bearings Div. General Motors 145

Illinois Tool Works 229
International Business Machines Corp. 37
International Packing Corp. 247
International Steel Company 350

Jeffrey Manufacturing Company .. 171
Jenkins Bros. .. 287
Johns-Manville Corporation .. 22
Jones & Lamson Machine Company 163

Kalman Floor Company .. 352
Keasbey & Mattison Company .. 243
Keller Tool Company .. 50
Kellogg Switchboard & Supply Co. 344
Kentile, Inc. .. 16
Kester Solder Company .. 276
Kex National Service .. 288
Kidde & Co., Inc., Walter .. 315
Kimberly-Clark Corporation .. 249
Kold-Hold Mfg. Co. .. 208
Koppers Company .. 327
Korfund Co., Inc. .. 180
Krieg Inc., Victor J. .. 346

Lamson & Sessions Company .. 229
Leblond Machine Tool Company, R. K. .. 28, 29
Legge Company, Inc., Walter G. .. 352
Lewis-Shepard Products, Inc. .. 307
Link-Belt Company .. 8, 24, 237, 258
Little Giant Products Co. .. 162
Logan Company .. 316
Lubriplate Division, Fiske Brothers Refining Co. .. 297
Lunkenheimer Company .. 273
Lyon Metal Products Inc. .. 34, 35
Lustra Corporation .. 362

Magnesium Company of America .. 298
Magnolia Metal Company .. 188
Manheim Mfg. & Belting Company 234
Mahon Company, R. C. .. 285
Master Electric Company .. 223
MB Manufacturing Co. .. 204
McCaskey Register Company .. 228
McGraw-Hill Book Co. .. 334, 360
Mechanical Handling Systems, Inc. 168
Mercoid Corporation .. 360
Mercury Manufacturing Co. .. 329
Merrill Brothers .. 348
Minnesota Mining & Mfg. Co. 211, 292
Mississippi Glass Co. .. 267
Mobilift Corp. .. 302
Modine Mfg. Co. .. 193
Monarch Rubber Co. .. 12
Multi-Clean Products, Inc. .. 159
Mystik Adhesive Products .. 221

National Air Sander, Inc. .. 352
National Bearing Division, American Brake Shoe Co. .. 36
National Lock Company .. 229
National Screw & Mfg. Co. .. 229
Nicholson File Company .. 185
Norton Company .. 245

Ohio Brass Company .. 51
Oil-Dri Corp. of America .. 252
Osborn Manufacturing Co. .. 4

Pangborn Corporation .. 186, 187, 320
Parker Appliance Company .. 308, 309
Parker-Kalon Corporation .. 229, 306
Peoria Malleable Castings Co. .. 250
Pheoll Mfg. Co. .. 229
Pittsburgh Coke & Chemical Co. .. 49
Pittsburgh Plate Glass Co. (Brush Div.) .. 322
Protectoseal Company .. 363
Pulverizing Machinery Company .. 362
Powell Pressed Steel Co. .. 60, 61

Radio Corporation of America Sound Products .. 241
Randolph Laboratories, Inc. .. 212
Ready-Power Company .. 340
Remington Rand, Inc. .. Second Cover
Republic Rubber Div., Lee Rubber & Tire Corp. .. 209
Resolite Corporation .. 322
Reznor Manufacturing Co. .. 161
Ridge Tool Co. .. 262
Rockford Screw Products Co. .. 229
Rome Cable Corporation .. 304
Roots-Connersville Blower Corp. .. 149
Roper Corporation, Geo. D. .. 166
Rotary Lift Co. .. 254
Russell, Burdsall & Ward Bolt & Nut Company .. 225
Rust-Oleum Corporation .. 41
Ryerson & Son, Inc., Joseph T. .. 64

Safway Steel Products, Inc. .. 266
Schramm, Inc. .. 358
Scovill Mfg. Co. .. 229
Screw Research Assn. .. 229
Servel, Inc. .. 321
Sexauer Mfg. Co., J. A. .. 356
Signode Steel Strapping Company .. 150
Simonds Abrasive Co. .. 176
Simonds Saw & Steel Co. .. 191
Simpson Electric Company .. 194
Skilsaw, Inc. .. 56, 57
Skinner Co., M. B. .. 363
Sly Manufacturing Co., W. W. .. 326
Smith Corporation, A. O. .. 139, 226
Snap-On Tools Corporation .. 324
South Bend Lathe .. 274
Southington Hardware Mfg. Co. .. 229
Speedi-Dri Corporation .. 192
Spencer-Turbine Company .. 344
Sperti-Faraday, Inc. .. 337
Square D Company .. Third Cover
Standard Conveyor Company .. 286
Standard Oil of Indiana .. 271
Standard Pressed Steel Co. .. 330, 361
Stanley Electric Tools Div., Stanley Works, Inc. .. 328
Steelcraft Mfg. Co. .. 348
Sterling Bolt Company .. 229
Sterling Electric Motors .. 251
Stewart Iron Works Co., Inc. .. 324
Sticht Co., Inc., Herman H. .. 363
Stronghold Screw Products, Inc. .. 229
Sturdi-Bilt Steel Products, Inc. .. 314
Sun Oil Company .. 137
Surface Combustion Corp. .. 148, 184

TelAutograph Corporation .. 174
Tennant Company, G. H. .. 40
Texas Company .. 66
Thomas Flexible Coupling Co. .. 172
Tide Water Associated Oil Co. .. 167
Timken Roller Bearing Co. .. Fourth Cover
Tokheim Oil Tank & Pump Co. .. 264
Toledo Scale Company .. 333
Tomkins-Johnson Company .. 268
Towmotor Corporation .. 23
Trane Company .. 343
Transitier Turck Company .. 350
Tremco Manufacturing Co. .. 340
Tropical Paint & Oil Company .. 165
Trumbull Electric Mfg. Co., Dept. of General Electric Co. .. 173
Tubing Appliance Co. .. 346

Udylite Corporation .. 259
Union Wire Rope Corp. .. 152
Unistrut Products Company .. 25
"Upright" Scaffolds .. 253

Valley Electric Corporation .. 358
Veeder Root, Inc. .. 11

Wagner Electric Company .. 351
Waldron Corporation, John .. 164
Wales-Beech Corp. .. 229
Wasco Flashing Co. .. 332
Webb Company, Jervis B. .. 210
Western Felt Works (Arcadia Synthetic Products Div.) .. 216
Westinghouse Electric Corp. .. Insert 48B, 48C, 54, 55, 179, 189, 196, 197, 277, 299
Westinghouse Electric Corp. (Electronics & X-Ray Div.) .. 158
Westinghouse Electric Corp. (Elevator Dept.) .. 283
Westinghouse Electric Corp. (Sturtevant Div.) .. 263
Wheeler Insulated Wire Co., Inc. .. 338
Wheeling Corrugating Company .. 296
Willson Products, Inc. .. 310
Wirebound Box Mfrs. Assn. .. 355
Worthington Pump & Machinery Corp. .. 323
Wrought Washer Mfg. Co. .. 305

Yale & Towne Mfg. Co. .. 59, 319
Young Radiator Company .. 305

■

INDUSTRIAL CONSULTANTS .. 368

■

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant .. 364, 365, 366
Selling Opportunities Offered 364, 366
Positions Wanted .. 366
Employment Services .. 364
SPECIAL SERVICES .. 366
EDUCATIONAL
Books .. 366
BUSINESS OPPORTUNITIES
Offered .. 366
PROPERTY
For Sale .. 366
EQUIPMENT
(Used or Surplus New)
For Sale .. 366, 367
WANTED
Equipment .. 366

Punch press builder insures good lubrication with Farval

FARVAL—*Studies in Centralized Lubrication* No. 126

ON this Warco press, there are no grease cups. Nothing is left to the judgment of the man with an oil can. The machine is protected by a Farval Centralized System of Lubrication.

Farval makes it routine to see that every bearing regularly gets the exact, measured amount of lubricant it requires. Each work shift, a few strokes of a hand pump lever provide adequate lubrication and keep the press running at top efficiency.

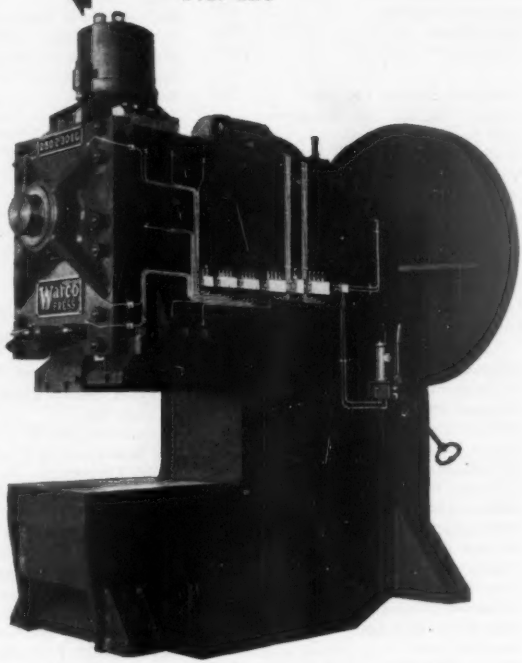
With Farval, special oilers are not needed, lubricant consumption is reduced, bearing life is extended materially and shutdowns for oiling or bearing replacement are eliminated. In short, with Farval on the job, the purchaser of a Warco press is insured of getting all the value built into the machine by its manufacturer.

Farval is the original Dualine system of centralized lubrication for industrial equipment, proved practical in 25 years of service. The Farval valve has only two moving parts — is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. Through its full hydraulic operation, the Farval system unfailingly delivers oil or grease to each bearing—as much as you want, exactly measured—as often as desired. Indicators at all bearings show that each valve has functioned.

In or near your city there's a Farval engineer, ready to discuss your lubrication problems and suggest a proper system to meet your particular needs.

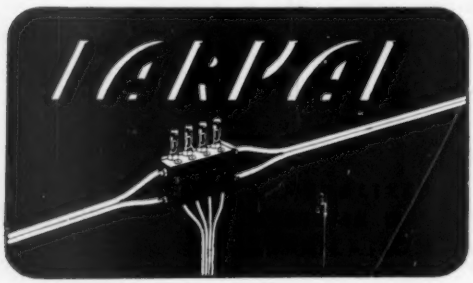
The Farval Corporation, 3256 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm and Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and control pumping station—you know a machine will be properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

Photo above by courtesy Federal Machine and Welder Co.



How TIMKEN® bearings help reduce speed—reduce wear

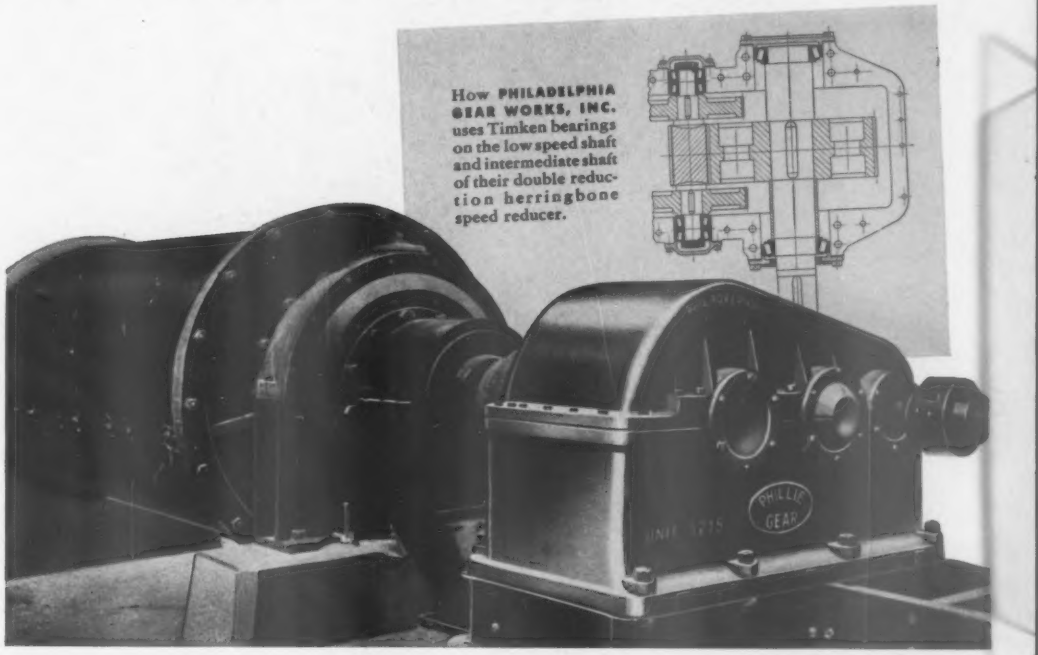
POWER is transmitted efficiently, with minimum wear on moving parts in this double reduction herringbone gear unit made by Philadelphia Gear Works. One reason: Timken® tapered roller bearings are used on the intermediate and slow speed shafts. Shafts are held in proper alignment, maintaining correct center distances. Gears mesh smoothly and accurately, minimizing wear and friction.

Because Timken bearings are tapered in design, they carry both radial and thrust loads or any combination without deflection or end-play. Timken bearings have extra load-carrying capacity due to line contact between rollers and races. Their true rolling motion and incredibly smooth surface finish practically eliminate friction.

Closures are more effective because Timken bearings hold shaft and housing concentric. Since Timken bearings are precision manufactured, engineered for the job and made of Timken fine alloy steel, they normally last the life of the machine.

No other bearing can give you all the advantages you get with Timken bearings. Backed by over 50 years of bearing research and development they are first choice throughout industry. Be sure to ask for Timken bearings on the machines you buy and use them on the machines you build. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.


How PHILADELPHIA GEAR WORKS, INC. uses Timken bearings on the low speed shaft and intermediate shaft of their double reduction herringbone speed reducer.
PHILLIE GEAR

DESIGN LEADERSHIP

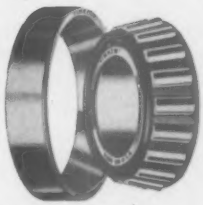
The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roll ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

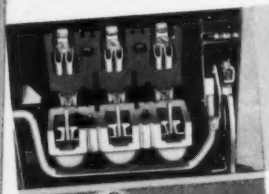


NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬮ AND THRUST →⬮← LOADS OR ANY COMBINATION ✳

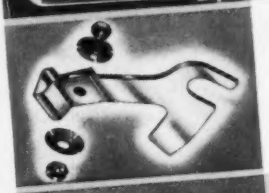
FACT:
Square D Type A Safety Switches are the overwhelming first choice of industry

REASON:
DESIGN LEADERSHIP

PROOF:
a feature-by-feature comparison

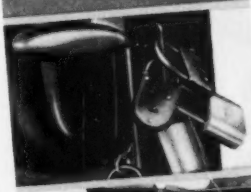


Magnetic Arc Suppressors
"blow out" the arc, contribute to exceptionally high interrupting capacity.

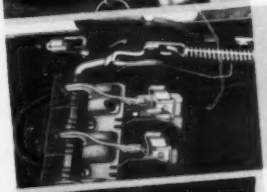


Spring-Loaded Blade Hinges
for pressure contact. **Silver plated** current-carrying parts. Not flash plated but completely plated to reduce temperature rise.

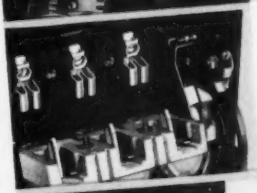
Positive Pressure Fuse Clips
reduce heating at fuse contacts 60% or more.



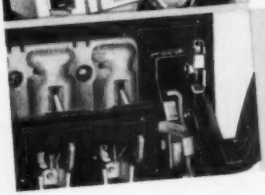
Padlock Attachment
locks switch "ON" or "OFF" with 1, 2, 3 or 4 padlocks of virtually any shape or size.



True Quick-Make, Quick-Break
Mechanism design makes it impossible to retard or to "tease" the operation.



Dead Front
construction. All exposed parts are dead when switch is in "OFF" position. **Hinged Arc Barrier** makes it easy to reach line terminals.



Full Cover Interlock
Switch cover can be opened or closed by authorized personnel without removing parts or interrupting service.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S. A., MEXICO CITY, D.F.